

2006 ACCESSORIES & EQUIPMENT

Roof - Lucerne

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Door Check Link Bolt to Hinge Pillar Bolt	9 N.m	80 lb in
Door Hinge to Pillar Bolts	25 N.m	18 lb ft
Sunroof Motor/Actuator Screws	6 N.m	53 lb in
Sunroof Drain Channel Screws	2 N.m	18 lb in
Sunroof Module to Roof Ring Bolts	9 N.m	80 lb in
Sunroof Overhead Console Screws	2 N.m	18 lb in
Sunroof Window Screws	5.8 N.m	51 lb in

SCHEMATIC AND ROUTING DIAGRAMS

SUNROOF SCHEMATICS

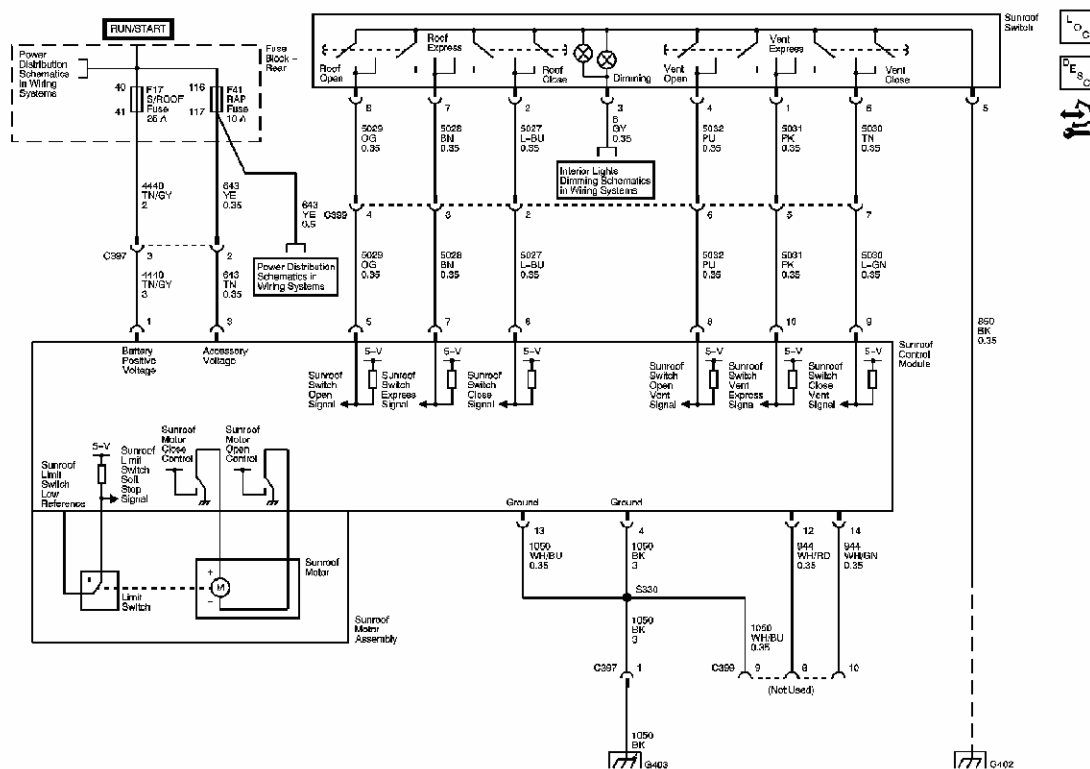


Fig. 1: Sunroof Schematic

Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

POWER ROOF SYSTEMS COMPONENT VIEWS

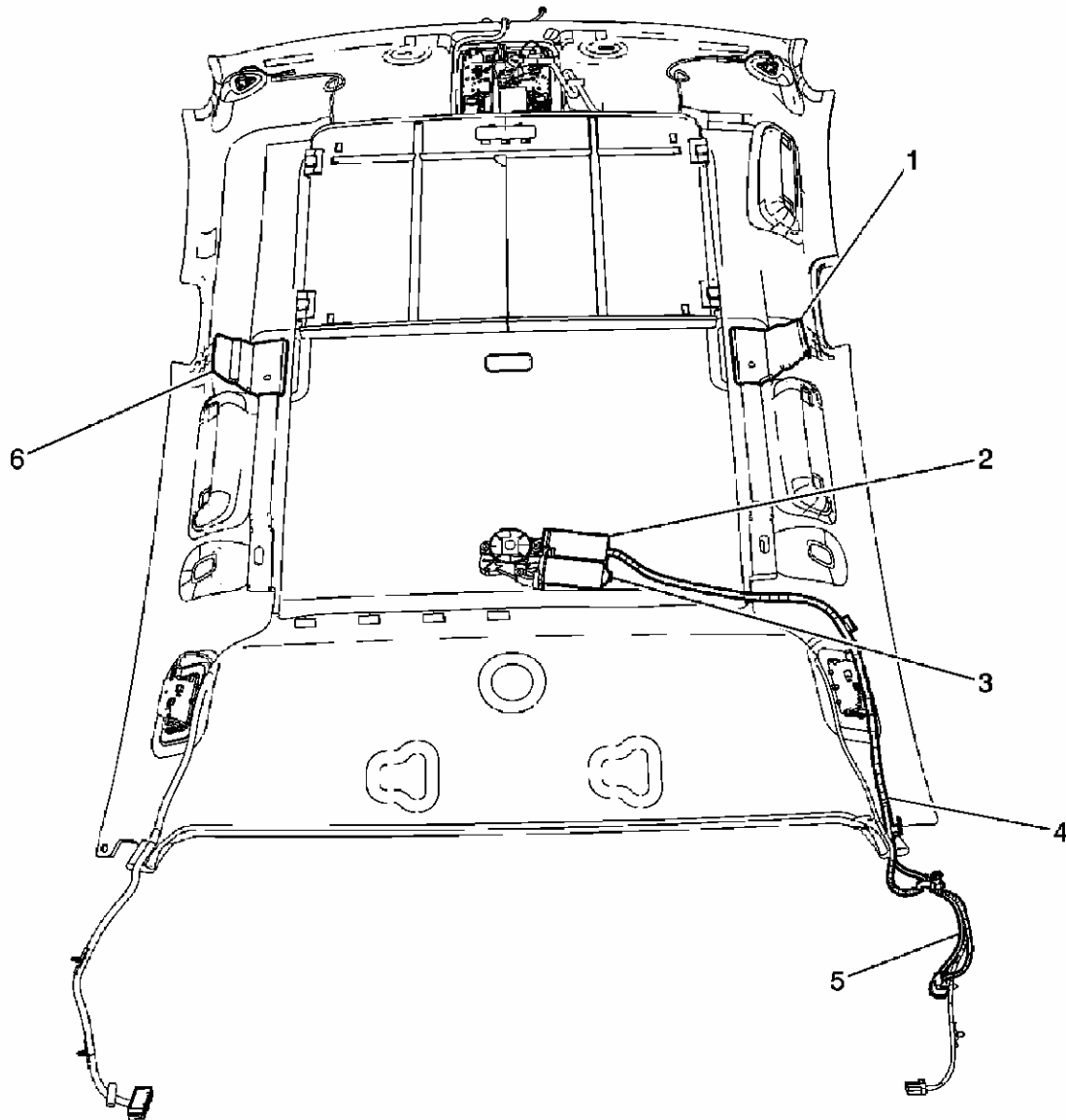


Fig. 2: Identifying Headliner Components w/CF5

Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 2

Callout	Component Name
1	Roof Rail Airbag-Right
2	Sunroof Control Module (CF5)

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Callout	Component Name
1	Sunroof Motor (CF5)
2	Sunroof Rail Airbag-Right
3	Sunroof Control Module (CF5)
4	Sunroof Rail Airbag-Left
5	Roof Rail Airbag-Right
6	Roof Rail Airbag-Left

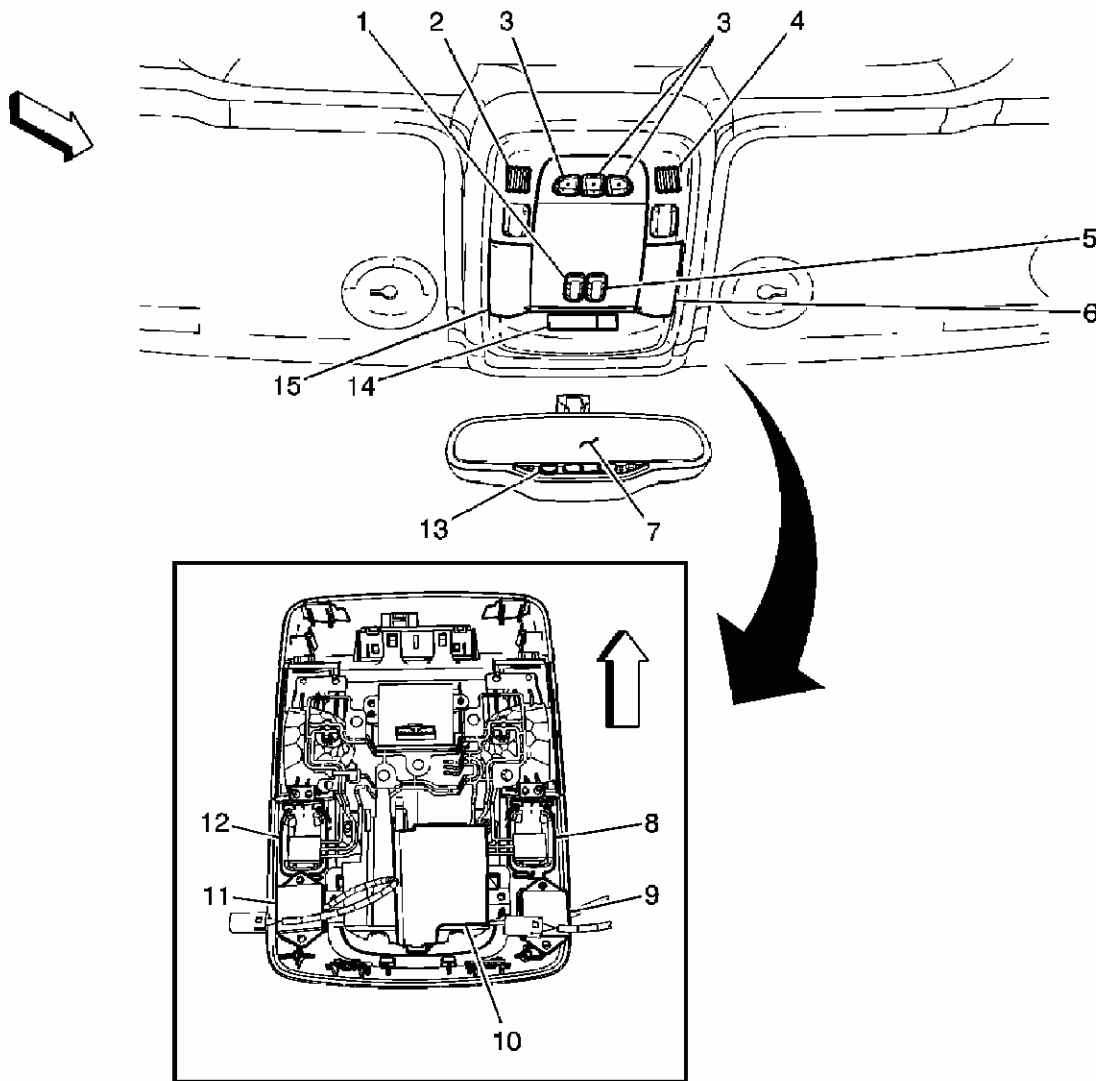


Fig. 3: Identifying Overhead Console and Inside Rearview Mirror Components
 Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 3

Callout	Component Name
1	Sunroof Switch - Open/Close (CF5)
2	Cellular Microphone (UE1, U3U)
3	Garage Door Opener Buttons (UG1)
4	Cellular Microphone (UE1, U3U)

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Callout	Component Name
1	Sunroof Switch - Vent (CF5)
2	Courtesy Lamp - Open/Close (CH5) Right
3	Inflatable Restraint Module (UE1, U3U)
4	Courtesy Lamp Switch - Right (UG1)
5	Cellular Microphone (UE1, U3U)
10	Garage Door Opener Transmitter (UG1)
11	Cellular Microphone (UE1, U3U)
12	Courtesy Lamp Switch - Left
13	OnStar Button Assembly
14	Inflatable Restraint I/P Module Indicator
15	Courtesy Lamp Overhead Console - Left

POWER ROOF SYSTEMS CONNECTOR END VIEWS

Sunroof Control Module (CF5)

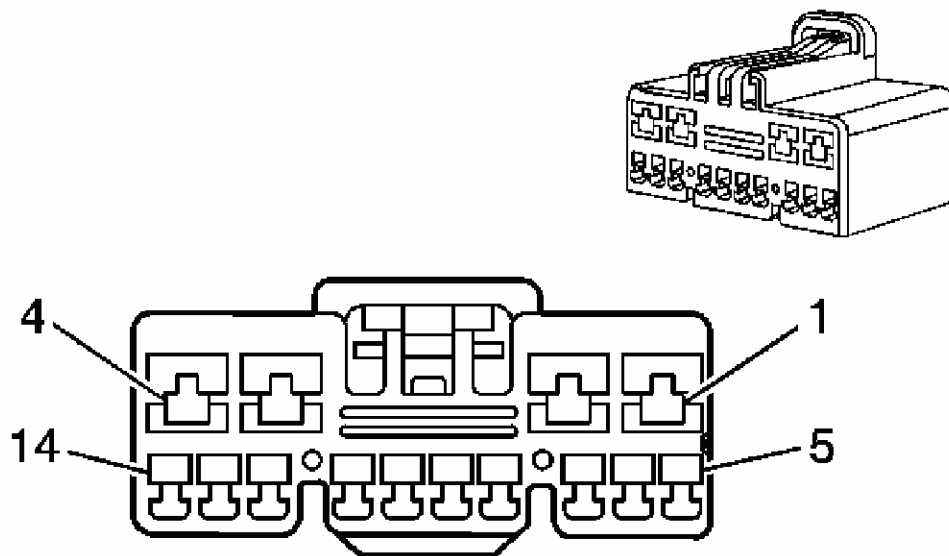


Fig. 4: Sunroof Control Module (CF5) Connector End View
Courtesy of GENERAL MOTORS CORP.

Power Roof Systems Connector End Views

Connector Part Information

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- OEM: 7283-8398-40
- Service: See Catalog
- Description: 14-Way F (GY)

Terminal Part Information

- Terminal/Tray: See Terminal Repair Kit
- Core/Insulation Crimp: See Terminal Repair Kit
- Release Tool/Test Probe: See Terminal Repair Kit

Sunroof Control Module (CF5)

Pin	Wire Color	Circuit No.	Function
1	TN/GY	4440	Battery Positive Voltage
2	-	-	Not Used
3	TN	643	Accessory Voltage
4	BK	1050	Ground
5	OG	5029	Sunroof Switch Data 3
6	L-BU	5027	Sunroof Switch Data 1
7	BN	5028	Sunroof Switch Data 2
8	PU	5032	Sunroof Switch Data 6
9	L-GN	5030	Sunroof Switch Data 4
10	PK	5031	Sunroof Switch Data 5
11	-	-	Not Used
12	WH/RD	944	Not Used
13	WH/BU	1050	Not Used
14	WH/GN	944	Not Used

Sunroof Switch (CF5)

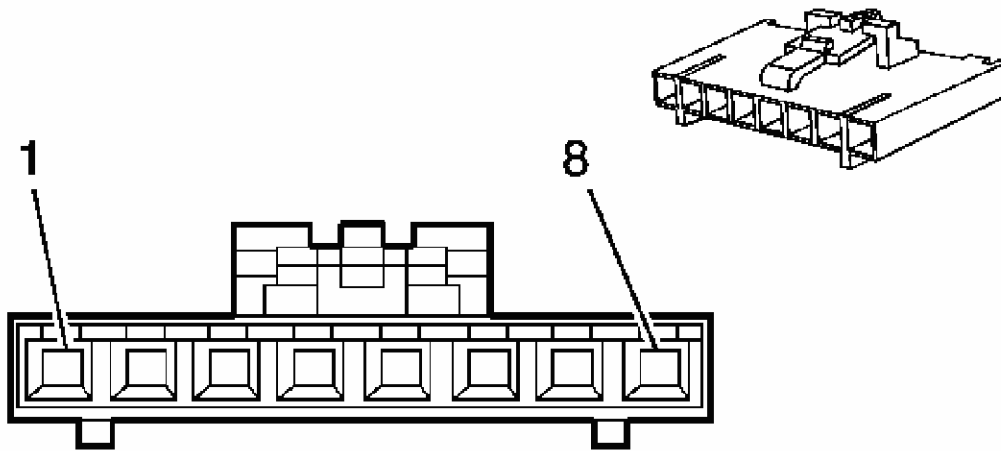


Fig. 5: Sunroof Switch (CF5) Connector End View
Courtesy of **GENERAL MOTORS CORP.**

Power Roof Systems Connector End Views

Connector Part Information

- OEM: 50-57-9408
- Service: 89046705
- Description: 8-Way F (BK)

Terminal Part Information

- Terminal/Tray: 16-02-1110/20
- Core/Insulation Crimp: H/H
- Release Tool/Test Probe: J-38125-213/J-35616-64B (L-BU)

Sunroof Switch (CF5)

Pin	Wire Color	Circuit No.	Function
1	PK	5031	Sunroof Switch Data 5
2	L-BU	5027	Sunroof Switch Data 1
3	GY	8	Instrument Panel Lamp Supply Voltage
4	PU	5032	Sunroof Switch Data 6
5	BK	850	Ground
6	TN	5030	Sunroof Switch Data 4

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Pin	Wire Color	Circuit No.	Sunroof Switch Function
8	OR	56291	Sunroof Switch Data 5

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - ROOF

Before you begin any diagnostic procedure, always review the system Description and Operation. Reviewing the Description and Operation will help you determine the correct diagnostic procedure, when a malfunction exists. Reviewing the Description and Operation will also help you determine if the condition described by the customer is normal operation.

After reviewing the system description and operation, always begin the system diagnosis with the **Diagnostic System Check - Vehicle** . The Diagnostic System Check will provide the following information:

- The identification of the control modules which command the system
- The ability of the control modules to communicate through the serial data circuit
- The identification of any stored diagnostic trouble codes and their status

The use of the Diagnostic System Check will identify the correct procedure for diagnosing the system and where the procedure is located.

SYMPTOMS - ROOF

IMPORTANT: Complete the following procedures before using the symptom tables.

1. Perform the **Diagnostic System Check - Vehicle** in order to verify that all of the following conditions are true:
 - No DTCs are set.
 - The control modules can communicate via the serial data link.
2. Review the system description and operation in order to learn the system functions. Refer to **Sunroof Description and Operation**.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the power sunroof system. Refer to **Checking Aftermarket Accessories** .
- Inspect the accessible system components for obvious damage or for conditions which can cause the symptom.

Intermittent

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Faulty electrical connections or wiring may be the cause intermittent conditions. Refer to **Testing for Intermittent Conditions and Poor Connections** .

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

Power Sunroof Inoperative

POWER SUNROOF INOPERATIVE

Diagnostic Fault Information

Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

Power Sunroof Inoperative

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Accessory Voltage	1	1	-	-
Battery Positive Voltage	1	1	-	-
Sunroof Module Ground	-	1	-	-
Sunroof Switch Close Signal	1	1	1	-
Sunroof Switch Close Vent Signal	1	1	1	-
Sunroof Switch Express Signal	1	2	1	-
Sunroof Switch Express Vent Signal	1	2	1	-
Sunroof Switch Low Reference	-	1	-	-
Sunroof Switch Open Signal	1	1	1	-
Sunroof Switch Open Vent Signal	1	1	1	-
1. Power sunroof inoperative				
2. Power sunroof express feature inoperative				

Circuit/System Description

The sunroof module determines the sunroof motor direction based on inputs received from the overhead console sunroof switches. The module supplies each of the sunroof switch signal circuits with a 5-volt reference. When the switch is pressed the signal circuit is pulled low signaling the roof open or closed request. When the ignition switch is in the ON position or

when retained accessory power (RAP) is active, voltage is applied to the sunroof module via the RAP relay and the S/ROOF fuse. For a description and operation of the RAP system, refer to **Retained Accessory Power (RAP) Description and Operation** . The sunroof module controls the sunroof motor direction by changing the polarity of the applied voltage. The sunroof module remembers the sunroof position whenever the ignition switch is turned to the OFF position. The limit switch is used as an input to the sunroof module to indicate that the glass is fully closed or in the soft stop positions. The limit switch is grounded only when the sunroof glass is in the fully closed or soft stop positions, otherwise it is open.

Diagnostic Aids

A short to B+ on any of the sunroof switch signal circuits will open the ground trace in the sunroof switch.

Reference Information

Schematic Reference

Sunroof Schematics

Connector End View Reference

Power Roof Systems Connector End Views

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

- **Scan Tool Output Controls**
- **Scan Tool Data List**
- **Scan Tool Data Definitions**

Circuit/System Testing

Power Sunroof Inoperative

1. Ignition OFF, disconnect the harness connector at the sunroof switch.
2. Interior lamps OFF, Test for less than 10 ohms of resistance between the ground circuit terminal 5 and ground.
 - If greater than 10 ohms, test the ground circuit for an open/high resistance.

3. Connect a 3A fused jumper wire between the following sunroof switch signal circuits and ground. The roof should be inoperative in at least one or more directions.
 - Terminal 8 sunroof switch open signal
 - Terminal 2 sunroof switch close signal
 - Terminal 4 sunroof switch open vent signal
 - Terminal 6 sunroof switch close vent signal
 - If the roof moved in all directions, replace the sunroof switch.
4. Disconnect the harness connector at the sunroof motor/actuator assembly.
5. Test for less than 1 ohms of resistance between the ground circuit terminal 4 and ground.
 - If greater than 1 ohms, test the ground circuit for an open/high resistance.
6. Test for less than 1 ohms of resistance between the ground circuit terminal 13 and ground.
 - If greater than 1 ohms, test the ground circuit for an open/high resistance.
7. Ignition ON, verify that a test lamp illuminates between the battery positive voltage circuit terminal 1 and ground.
 - If the test lamp does not illuminate, test the battery positive voltage circuit for a short to ground or an open/high resistance
8. Ignition ON, verify that a test lamp illuminates between the battery positive voltage circuit terminal 2 and ground.
 - If the test lamp does not illuminate, test the accessory voltage circuit for a short to ground or an open/high resistance
9. Ignition OFF, connect the harness connector at the sunroof motor/actuator assembly.
10. Ignition ON, test for 4.8-5.2 volts between the following sunroof switch signal circuits and ground.
 - Terminal 1 sunroof express vent signal
 - Terminal 2 sunroof switch close signal
 - Terminal 4 sunroof switch open vent signal
 - Terminal 6 sunroof switch close vent signal
 - Terminal 7 sunroof express signal
 - Terminal 8 sunroof switch open signal
 - If less than 4.8 volts, test the appropriate signal circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the sunroof motor/actuator assembly.
 - If greater than 5.2 volts, test the appropriate signal circuit for a short to voltage. If the circuit tests normal, replace the sunroof motor/actuator assembly.
11. Ignition OFF, connect the harness connector at the sunroof switch.
12. If all circuits test normal, test or replace the sunroof motor/actuator assembly.

Power Sunroof Express Feature Inoperative

1. Ignition OFF, disconnect the harness connector at the sunroof switch.
2. Ignition ON, with the sunroof in the closed position, connect a 3A fused jumper wire between the sunroof switch open signal circuit terminal 8 and the sunroof express signal circuit terminal 7 to ground for less than 1 second. The roof should express open.
 - If the roof did not express open, test the express signal circuit for a short to voltage or an open high resistance. If the circuit tests normal, replace the sunroof motor/actuator assembly.
3. Ignition ON, with the sunroof in the closed position, connect a 3A fused jumper wire between the sunroof switch vent open signal circuit terminal 4 and the sunroof express vent signal circuit terminal 1 to ground for less than 1 second. The roof should express vent open.
 - If the roof did not express vent open, test the express signal circuit for a short to voltage or an open high resistance. If the circuit tests normal, replace the sunroof motor/actuator assembly.
4. If all circuits test normal, test or replace the sunroof switch.

Component Testing**Sunroof Switch**

1. Ignition OFF, disconnect the harness connector at the sunroof switch.
2. Test for infinite resistance between the following sunroof switch terminals with the switch in the open position:
 - Switch low reference terminal 5 and roof open terminal 8
 - Switch low reference terminal 5 and roof express terminal 7
 - Switch low reference terminal 5 and roof close terminal 2
 - Switch low reference terminal 5 and vent open terminal 4
 - Switch low reference terminal 5 and vent express terminal 1
 - Switch low reference terminal 5 and vent close terminal 6
 - If less than infinite for any test, replace the sunroof switch.

IMPORTANT: If the switch tests open in any switch position other than Off, test the sunroof switch signal circuits for a short to voltage before replacing the switch.

3. Test for less than 3 ohms of resistance between the following sunroof switch terminals while pressing the appropriate switch.
 - Switch low reference terminal 5 and roof open terminal 8
 - Switch low reference terminal 5 and roof express terminal 7

- Switch low reference terminal 5 and roof close terminal 2
- Switch low reference terminal 5 and vent open terminal 4
- Switch low reference terminal 5 and vent express terminal 1
- Switch low reference terminal 5 and vent close terminal 6
- If greater than 3 ohms on any of the tests, replace the sunroof switch.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Sunroof Switch Replacement**
- **Sunroof Motor/Actuator Replacement (Smart Motor)**
- **Control Module References** for sunroof motor/actuator replacement, programming and setup

REPAIR INSTRUCTIONS**SUNROOF WINDOW HEIGHT AND OPENING FIT ADJUSTMENT****Adjustment Procedure**

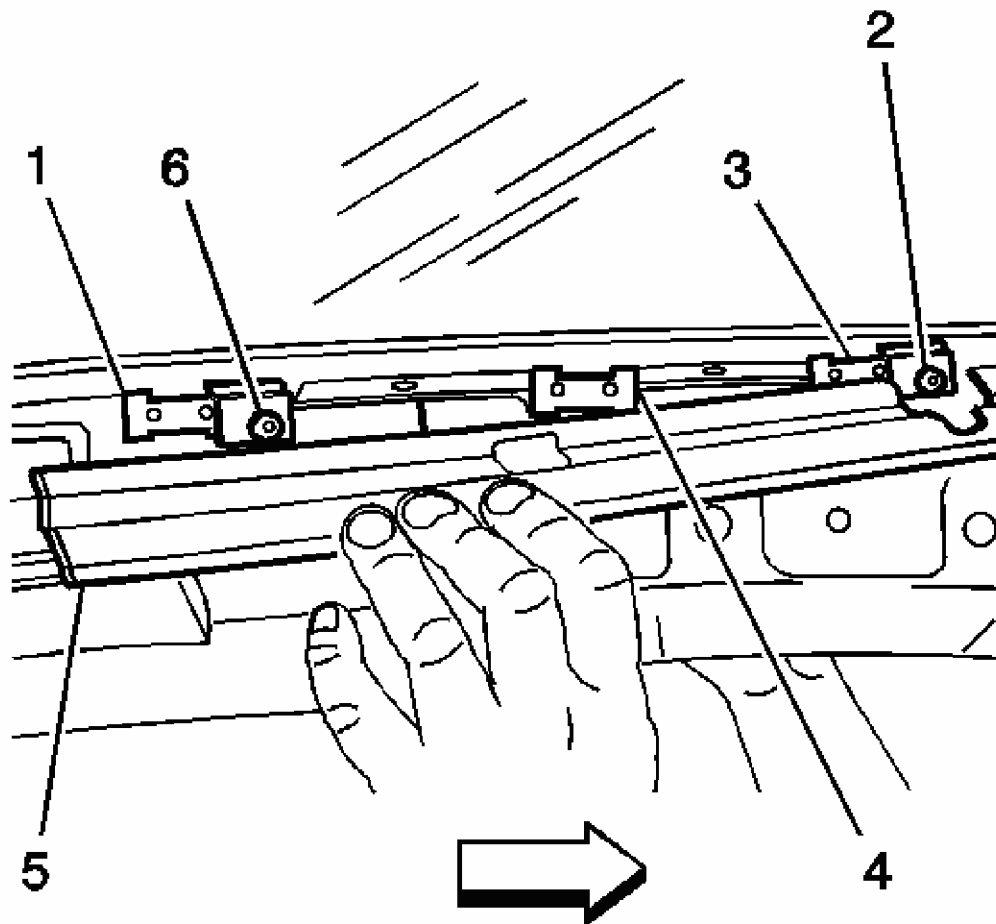


Fig. 6: Identifying Sunroof Panel Side Opening Closeout Panel Cover
Courtesy of GENERAL MOTORS CORP.

1. Cycle the sunroof window from the full open to the full closed position.
2. Fully cycle and close the sunroof window.
3. Disconnect the top side of the sunroof panel side opening closeout panel covers (5) from the 3 clips located on the inner edge of the sunroof window (1, 3, 4) in order to access the window adjustment screws (2, 6).
4. Tape the side opening closeout panels in a downward position prior to adjusting the window.

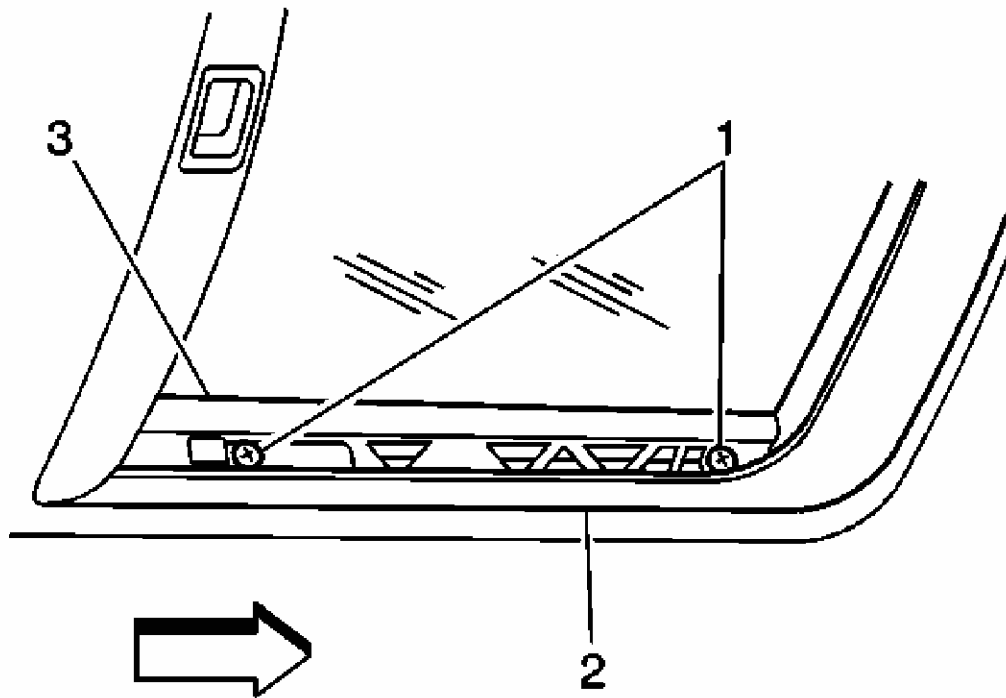


Fig. 7: Identifying Sunroof, Housing And Adjusting Screws
Courtesy of GENERAL MOTORS CORP.

5. Loosen the 2 adjusting screws (1) on each side of the sunroof window.
6. Center the window front to rear in the opening.

NOTE: Refer to FASTENER NOTICE .

NOTE: Use the correct fastener in the correct location. Replacement fasteners must be the correct part number for that application. Fasteners requiring replacement or fasteners requiring the use of thread locking compound or sealant are identified in the service procedure. Do not use paints, lubricants or corrosion inhibitors on fasteners or fastener joint surfaces unless specified. These coatings affect fastener torque and joint clamping force and may damage the fastener. Use the correct tightening sequence and specifications when installing fasteners in order to avoid damage to parts and systems.

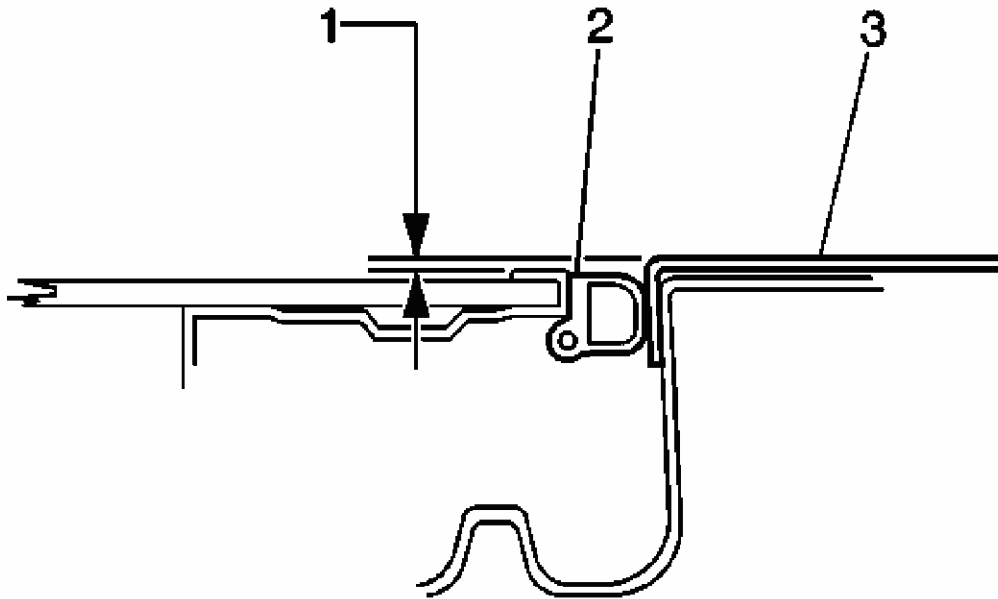


Fig. 8: Adjustment of Front of Sunroof Window Below Top Surface of Roof Panel

Courtesy of GENERAL MOTORS CORP.

7. Adjust the front of the sunroof window (2) from flush to 1 mm (0.04 in) (1) below the top surface of the roof panel (3).

Tighten: Tighten the adjustment screws to 5.8 N.m (51 lb in).

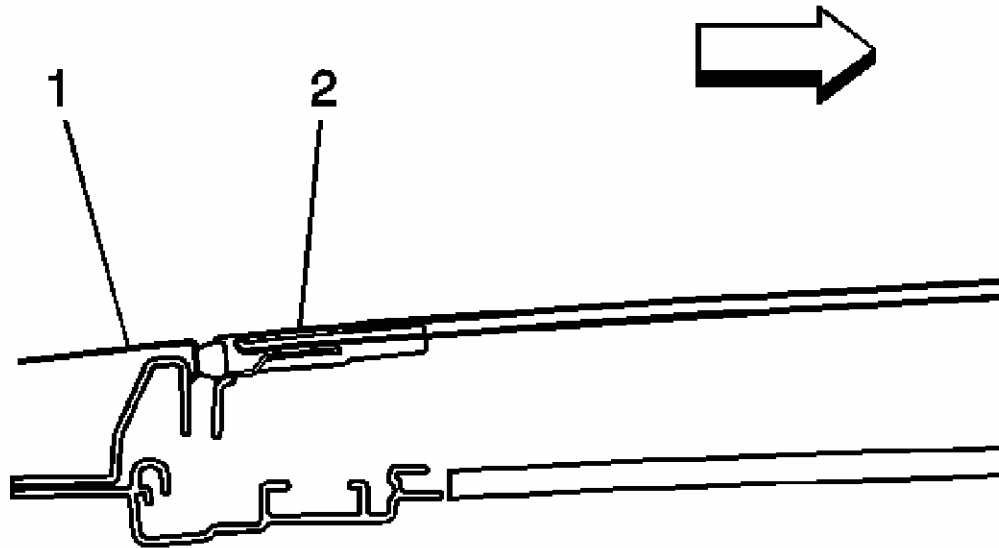


Fig. 9: Adjusting Rear Of The Sunroof Window
Courtesy of GENERAL MOTORS CORP.

8. Adjust the rear of the sunroof window (2) from flush to 1 mm (0.04 in) above the top surface of the roof panel (1).

Tighten: Tighten the adjustment screws to 5.8 N.m (51 lb in).

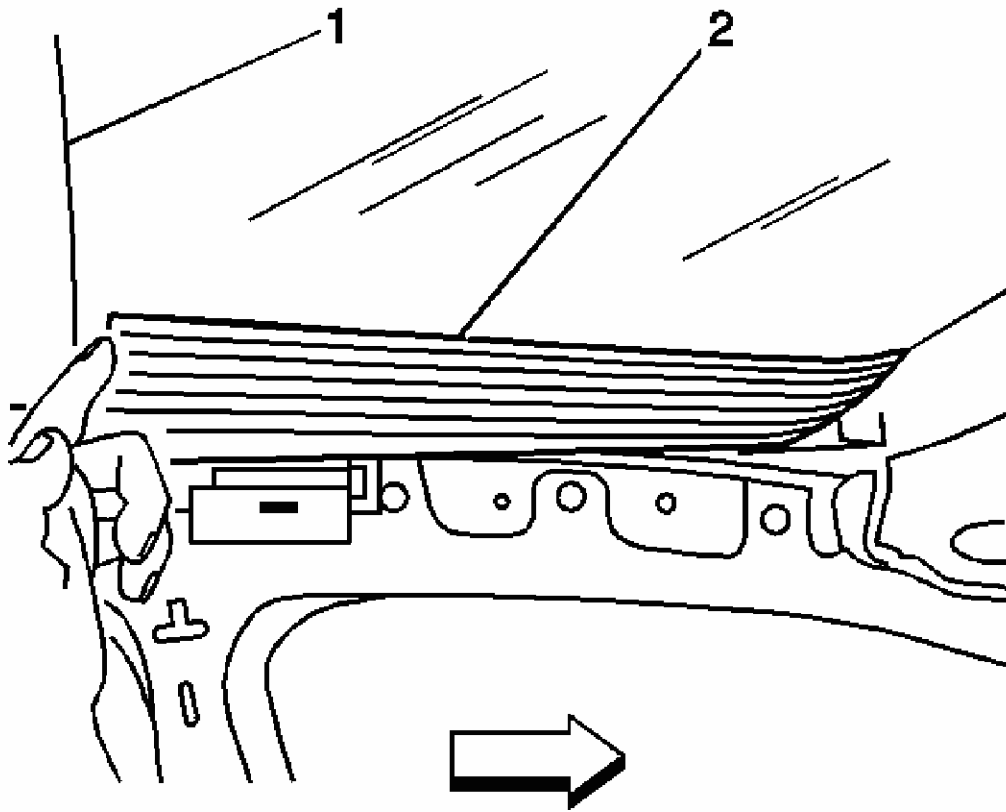


Fig. 10: Identifying Sunroof Panel Side Opening Closeout Cover
Courtesy of GENERAL MOTORS CORP.

9. Remove the tape from the sunroof panel side opening closeout covers (2).

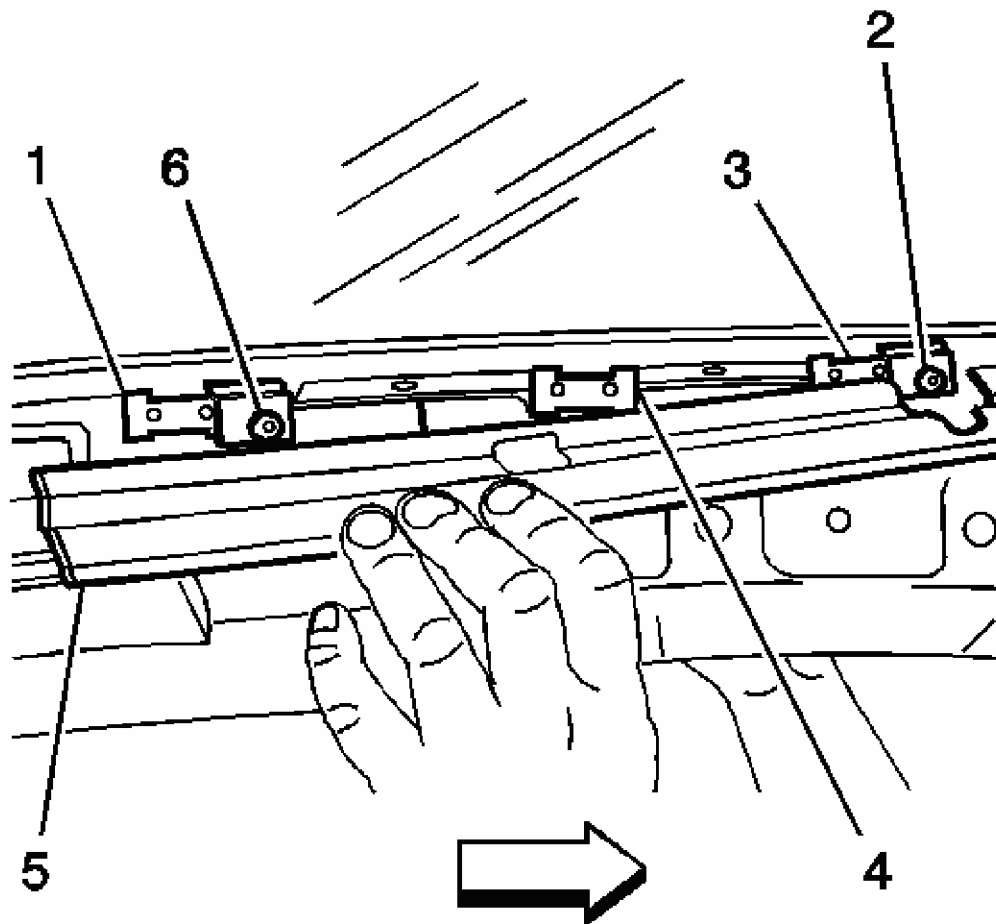


Fig. 11: Identifying Sunroof Panel Side Opening Closeout Panel Cover
Courtesy of GENERAL MOTORS CORP.

10. Connect the side opening closeout panel covers (5) to both sides of the sunroof window clips (1, 3, 4).
11. Cycle the sunroof window through all of the positions.
12. Verify the sunroof window fore/aft adjustment.
13. Verify the front and rear height adjustment.
14. Readjust the sunroof window, if necessary.

SUNROOF TRACK TIMING/SYNCHRONIZATION

1. Before retiming the module, the actuator/motor must be removed. Refer to **Sunroof Motor/Actuator Replacement (Smart Motor)**.

IMPORTANT: If the sunroof actuator is the only part being serviced, follow the power sunroof actuator replacement procedure for the sunroof actuator to sunroof window timing. Refer to Sunroof Motor/Actuator Replacement (Smart Motor). A new replacement power sunroof actuator is set to the fully closed and flush position at the factory.

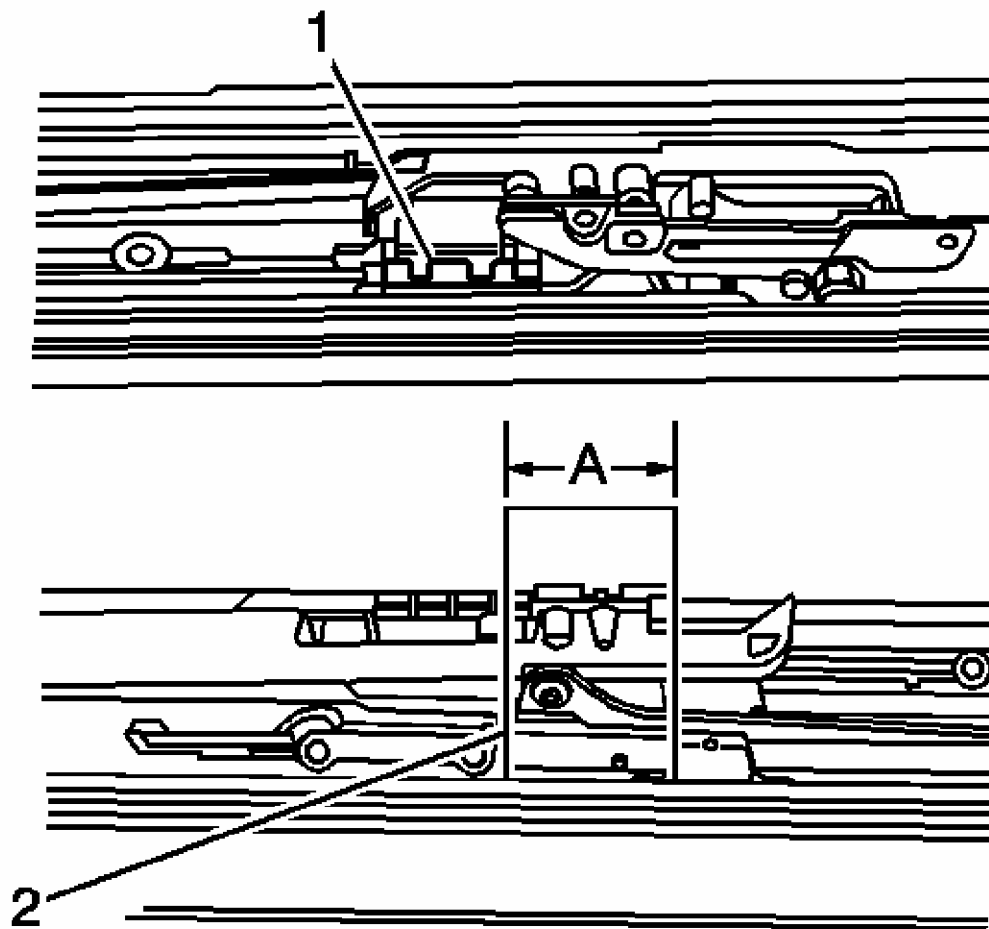


Fig. 12: View of Gage and Move Driver Slide
Courtesy of GENERAL MOTORS CORP.

2. Remove the sunroof window. Refer to Sunroof Window Replacement.
3. Fabricate a gage (2) 46.8 +/- 0.5 mm (1.84 in) wide (A).

A piece of thick paper will work.

4. Set the gage into the track near the rear of the opening between the move drive slide (1) and the bracket.
5. Move the drive slide fore or aft in order to get the proper setting.
6. Repeat steps 3 and 4 for the other side.
7. Install the sunroof window. Refer to **Sunroof Window Replacement**.
8. Install the sunroof actuator. Refer to **Sunroof Motor/Actuator Replacement (Smart Motor)**.
9. Operate the sunroof through all functions to ensure proper operation.

SUNROOF HOUSING FRONT DRAIN HOSE REPLACEMENT

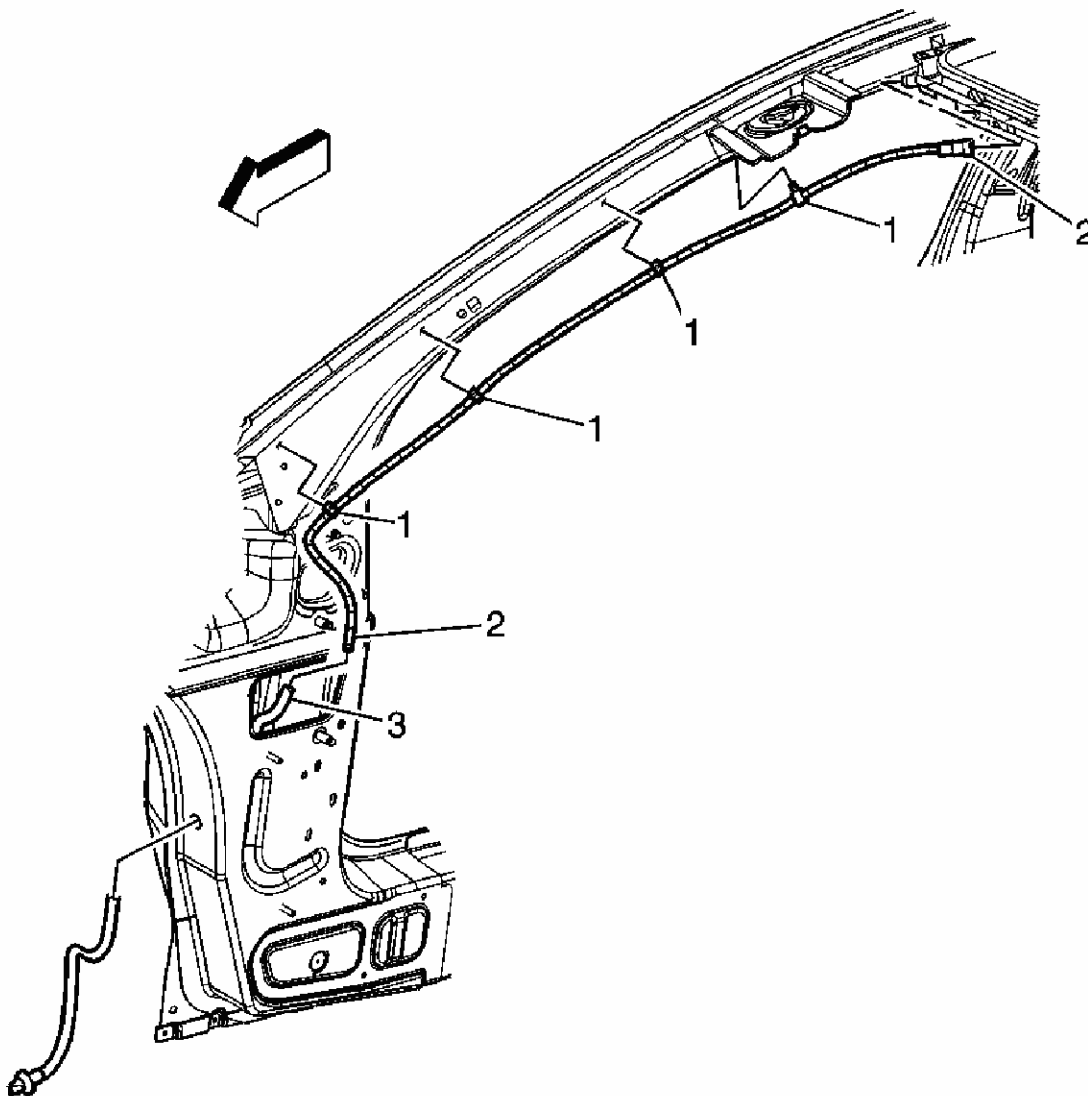


Fig. 13: Identifying Sunroof Housing Front Drain Hose
Courtesy of GENERAL MOTORS CORP.

Sunroof Housing Front Drain Hose Replacement

Callout	Component Name
Preliminary Procedures	
1. Remove the garnish pillar trim. Refer to <u>Windshield Pillar Garnish Molding Replacement</u> .	
2. Lower the headliner. Refer to <u>Headlining Trim Panel Replacement</u> .	
1	Sunroof Front Retainer Clip (Qty: 4) Tip: Remove the retainer clips from the side of the A pillar.
2	Sunroof Front Drain Hose Upper
3	Sunroof Front Drain Hose Lower Tip: Use care when removing the drain hose from the lower pillar not to pull grommet out.

SUNROOF HOUSING REAR DRAIN HOSE REPLACEMENT**Removal Procedure**

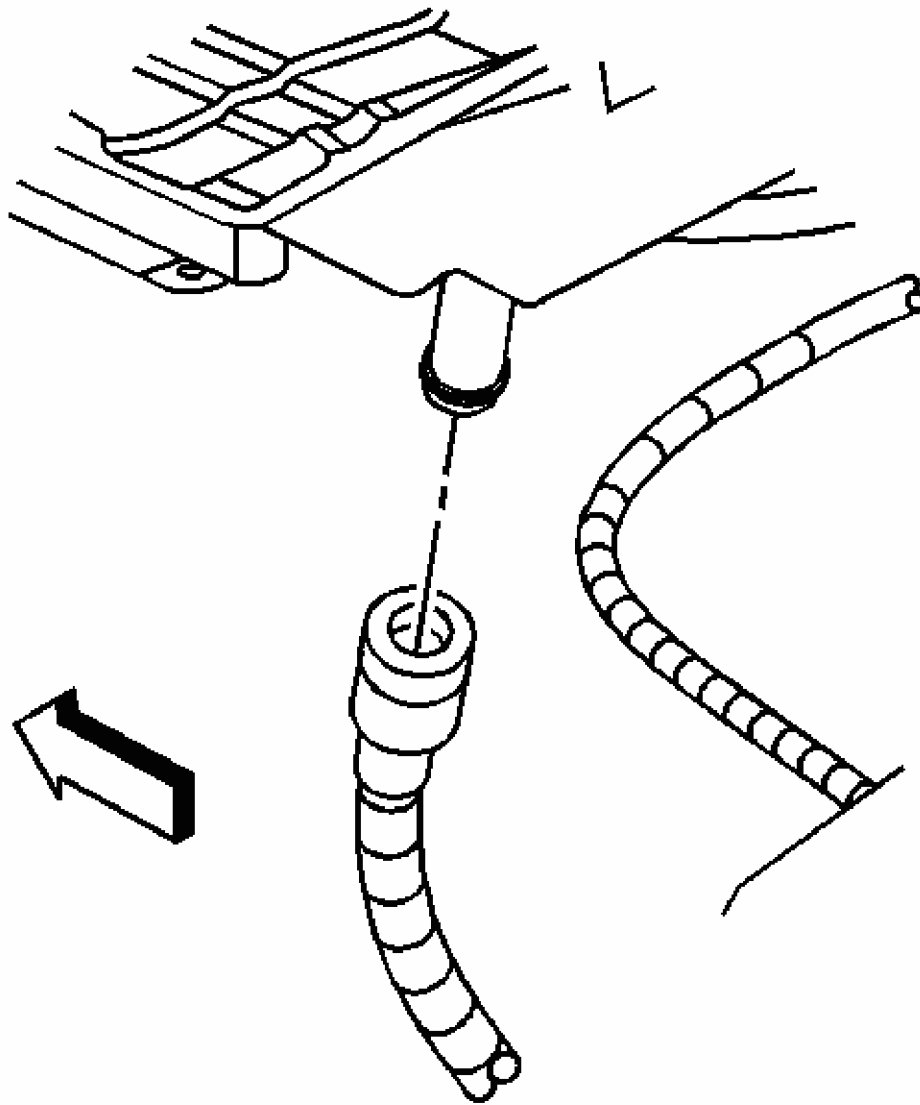


Fig. 14: Identifying Drain Hose At Drain Spout On Rear Of Sunroof Module
Courtesy of GENERAL MOTORS CORP.

1. Lower the headliner in order to access the upper rear drain hose connections. Refer to **Headlining Trim Panel Replacement** .
2. Disengage the drain hoses from the drain spouts on the rear of the sunroof module.

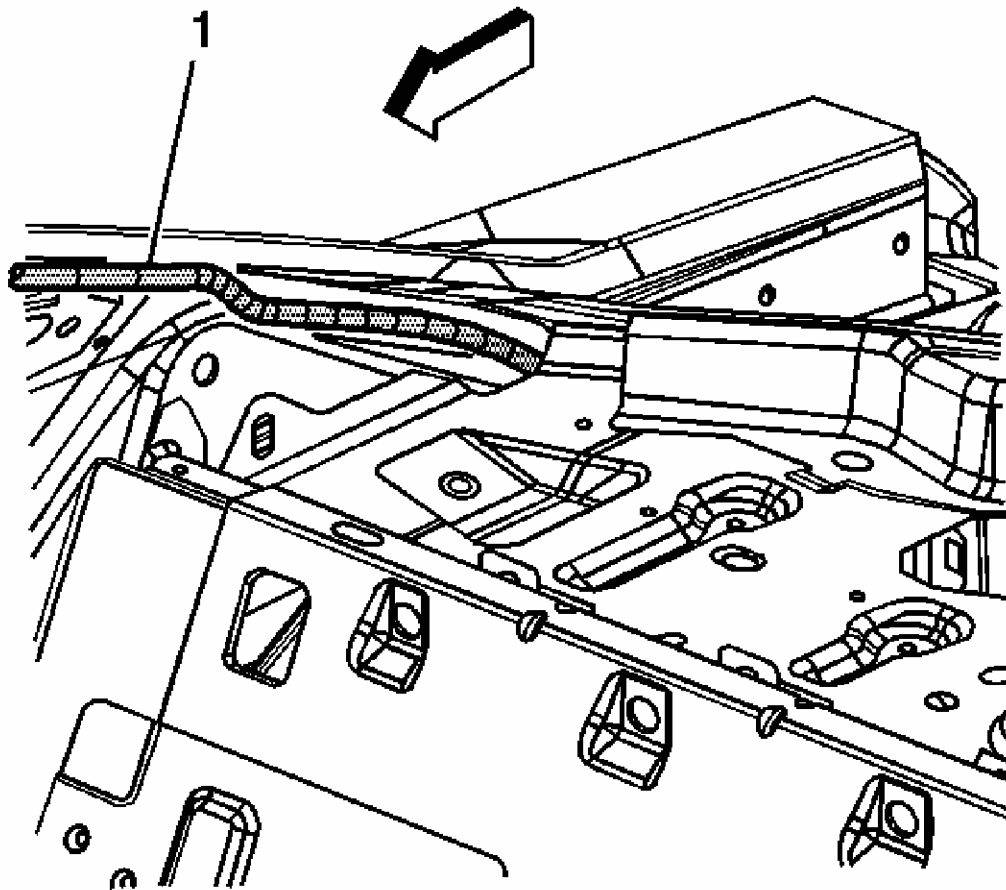


Fig. 15: Identifying Rear Upper Drain Hose
Courtesy of GENERAL MOTORS CORP.

3. Disengage the retainer clips from the rear upper drain hose (1).

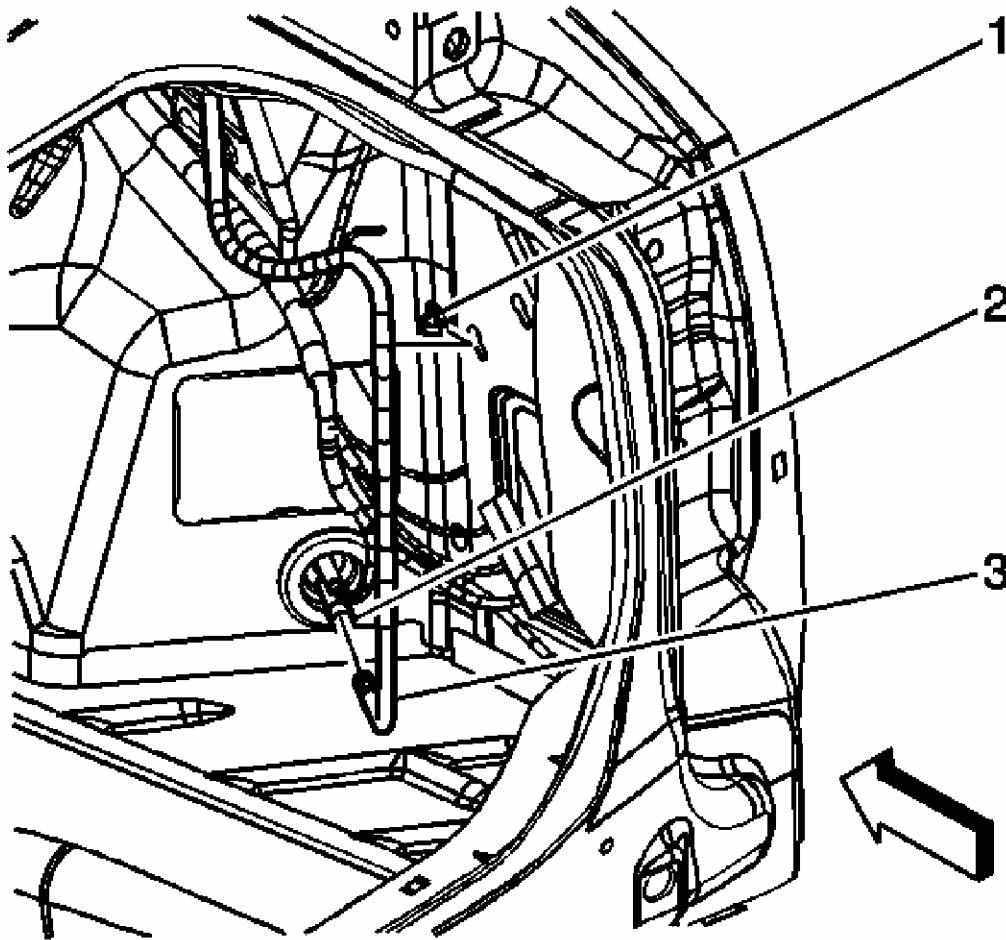


Fig. 16: Identifying Rear Drain Hose
Courtesy of GENERAL MOTORS CORP.

4. Remove the rear compartment trim panel. Refer to **Rear Compartment Trim Panel Replacement** .
5. Remove the rear lower drain hose from the retaining clips (1).
6. Remove the rear drain hose (3) from the inner wheelhouse drain spout (2).
7. Remove the drain hose from the vehicle.

Installation Procedure

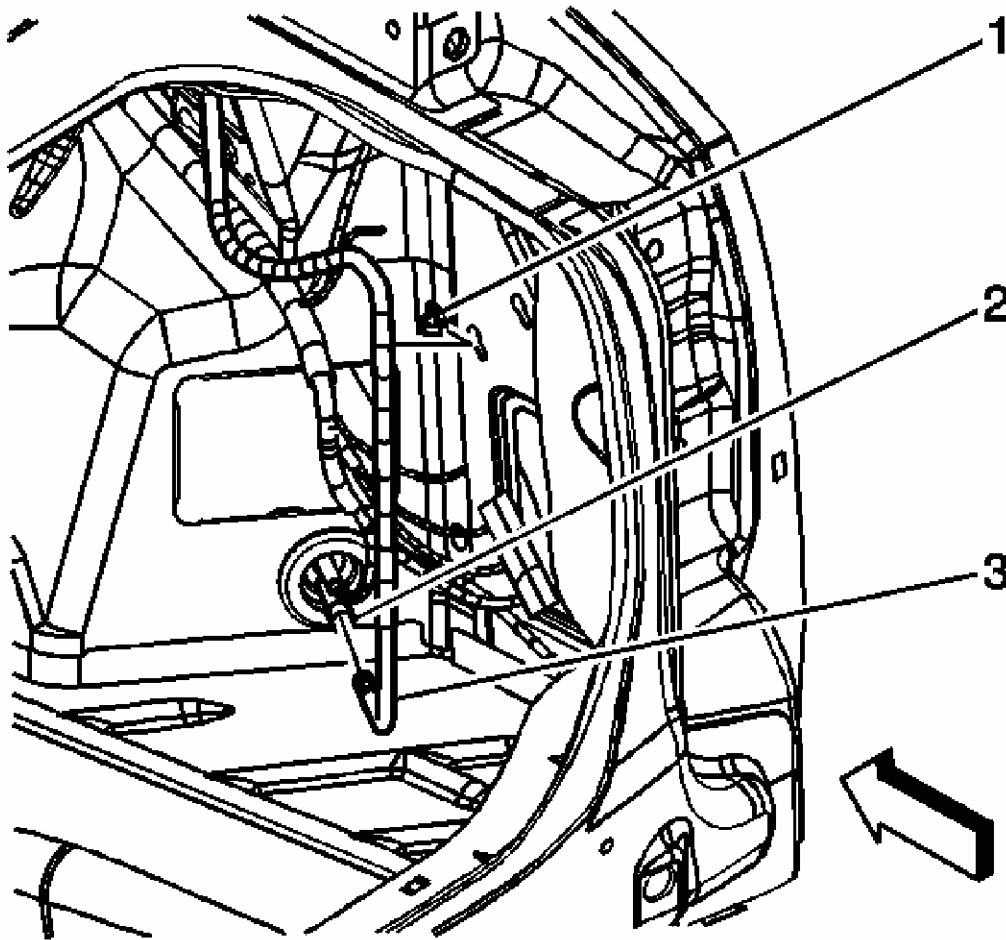


Fig. 17: Identifying Rear Drain Hose
Courtesy of GENERAL MOTORS CORP.

1. Guide the drain hose through the rear shelf panel to the D pillar behind the shoulder belt retractor.
2. Clip the rear lower drain hose (3) into the retention clips.
3. Secure the drain hose retainer clips to the sheet metal.

IMPORTANT: Secure the lower drain hose to the drain spout (2) at the inner wheelhouse panel.

4. Ensure the electrical grommet to drain hose drain spout is not pinched off after drain hose installation.
5. Install the rear compartment trim panel. Refer to **Rear Compartment Trim Panel**

Replacement .

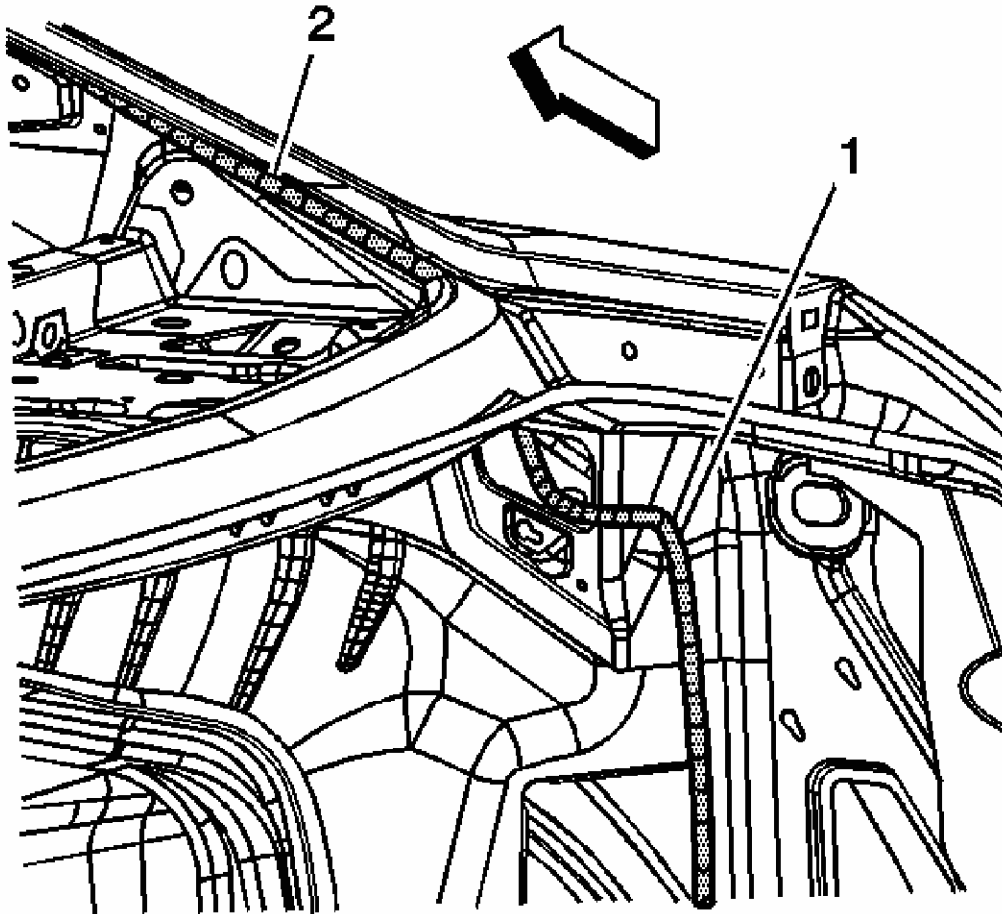


Fig. 18: Identifying Rear Upper Drain Hoses
Courtesy of GENERAL MOTORS CORP.

6. Clip the rear upper drain hoses (2) into position.

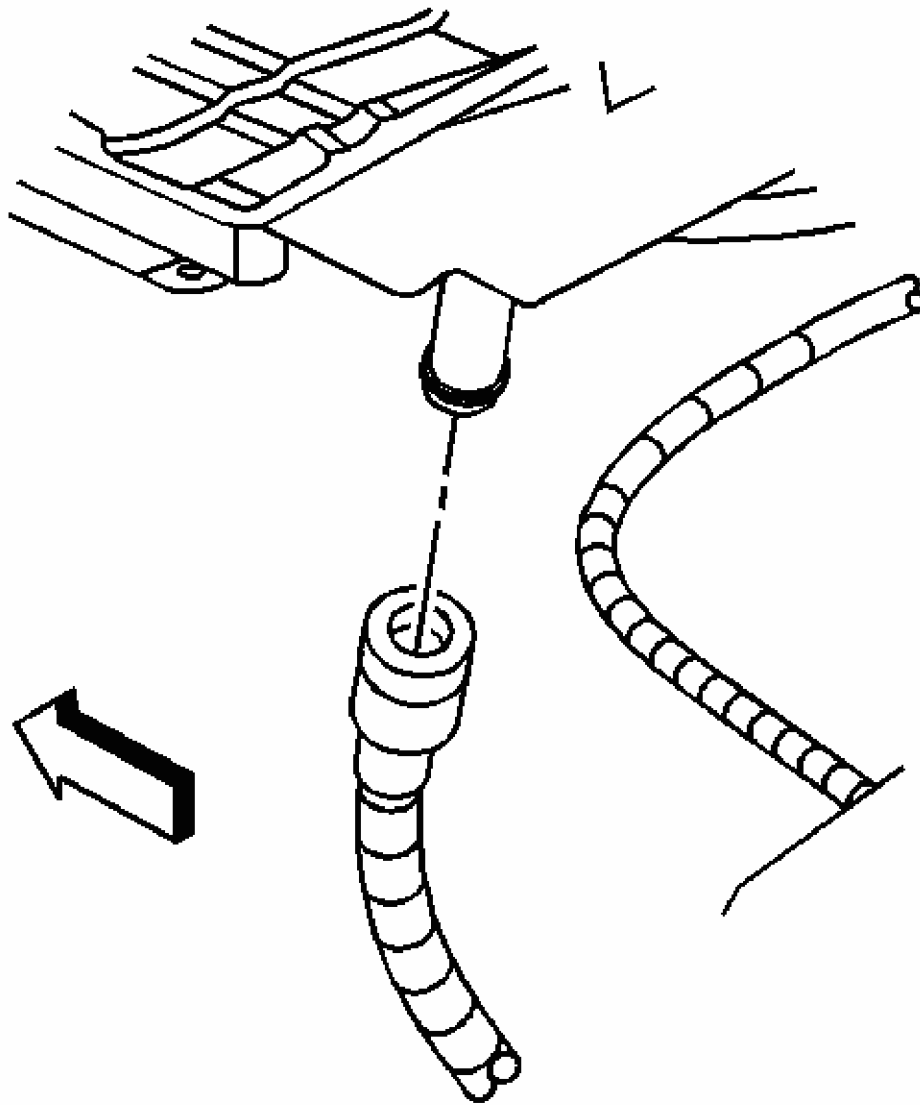


Fig. 19: Identifying Drain Hose At Drain Spout On Rear Of The Sunroof Module
Courtesy of GENERAL MOTORS CORP.

7. Secure the rear drain hose to the drain spout.

The only suitable lubricant is clean water for the drain hose to drain spout installation.

8. Inspect for proper drainage.

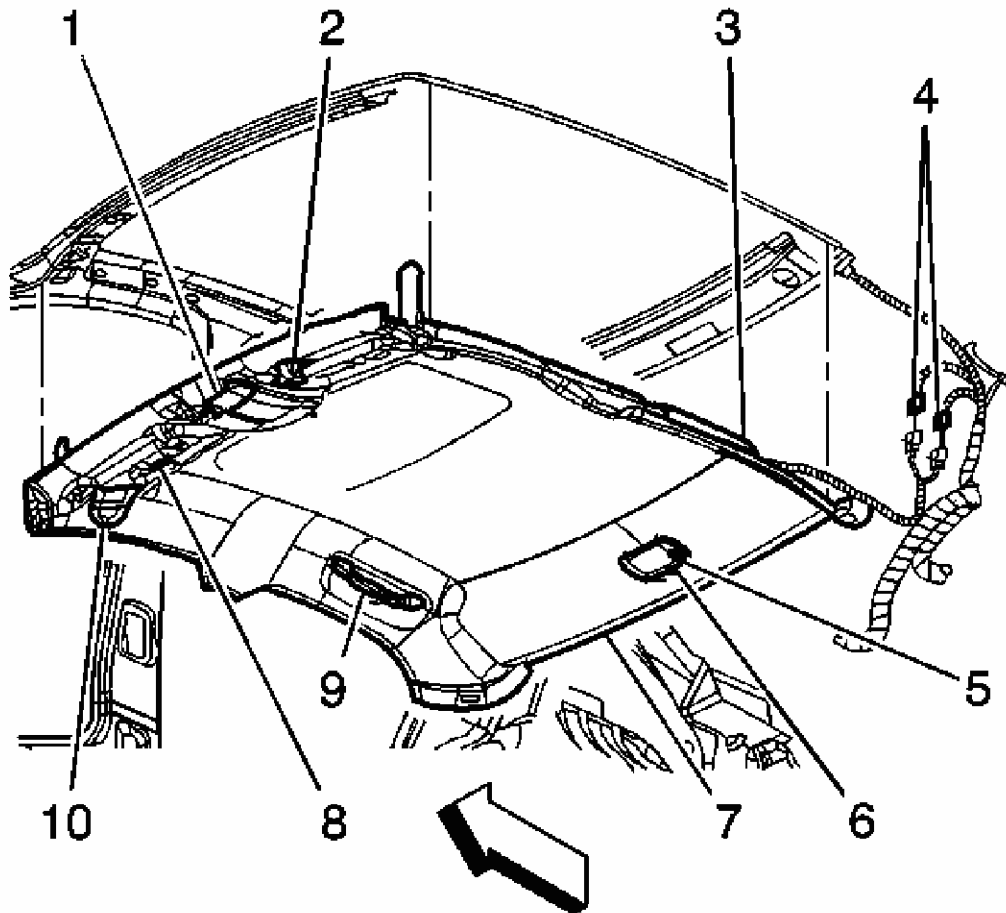


Fig. 20: Identifying Retainer Securing Headliner To Roof Panel Above Overhead Console

Courtesy of GENERAL MOTORS CORP.

9. Install the headliner (3) with an assistant. Refer to Headlining Trim Panel Replacement.

SUNROOF DRAIN INSPECTION AND CLEANING

IMPORTANT: The drain hoses are pushed on as an interference fit and are not clamped or cemented. Do NOT disconnect the hose from the drain channel spouts while cleaning.

A drain trough encircles the sliding panel which leads to the drain spouts and into the hoses. The drain hoses are located at each corner of the housing. The two front drain hoses route down the windshield pillars and exit out the hinge pillars between the door hinges. The two

rear drain hoses route down the rear sail and the quarter panels and exit the inner wheelhouse panels.

If you encounter a wet headliner or other water leak, inspect the following areas for the source of the leak:

- The windshield
- The rear window

Verify the drainage system is not plugged or restricted. Use the following procedure:

Inspection Procedure

1. With the sunroof open use a one pint container, pour water into the drain trough.
2. Open the front doors.
3. Inspect for water drainage exiting through the grommets at the hinge pillar.
4. Look at the rear of the inner wheelhouse panels for water exiting the rear drain hoses.
5. If the water flow is restricted, use a low volume of compressed air in order to clear the drainage system.
6. Retest the system.
7. If water drips from the headliner above the door, lower the headliner refer **Headlining Trim Panel Replacement** in Interior Trim as required, in order to inspect for a proper drain tube connections at the drain spouts.
8. If necessary, secure the tubes onto the housing drain spouts.
9. If blockage is still present, replace the restricted drain hose. Refer to **Sunroof Housing Front Drain Hose Replacement** or **Sunroof Housing Rear Drain Hose Replacement**.

SUNROOF SUNSHADE REPLACEMENT**Removal Procedure**

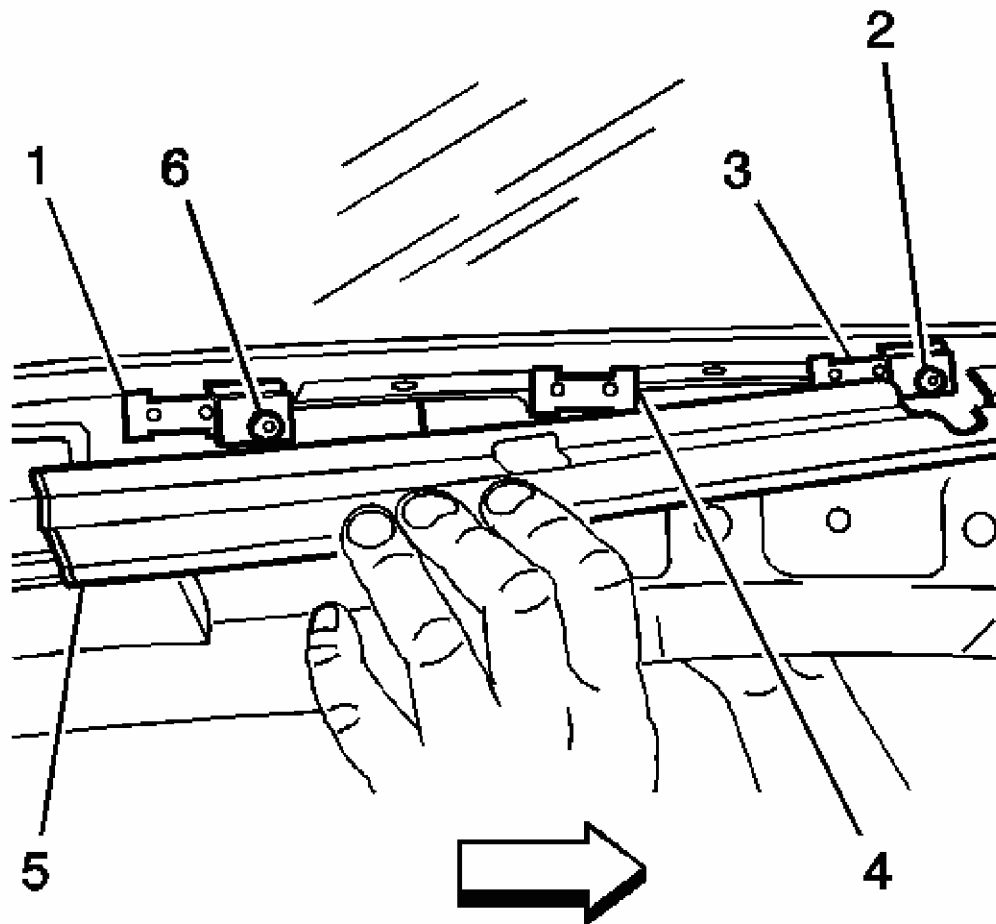


Fig. 21: Identifying Sunroof Panel Side Opening Closeout Panel Cover
Courtesy of GENERAL MOTORS CORP.

1. Cycle the sunroof window to the vent position in order to ease in the removal of the forward adjusting screws (2).
2. Slide the sunshade rearward.
3. Disconnect the sunroof panel side opening closeout covers (5) from the retention clips (1, 3, 4) in order to access the sunroof window screws (2, 6).

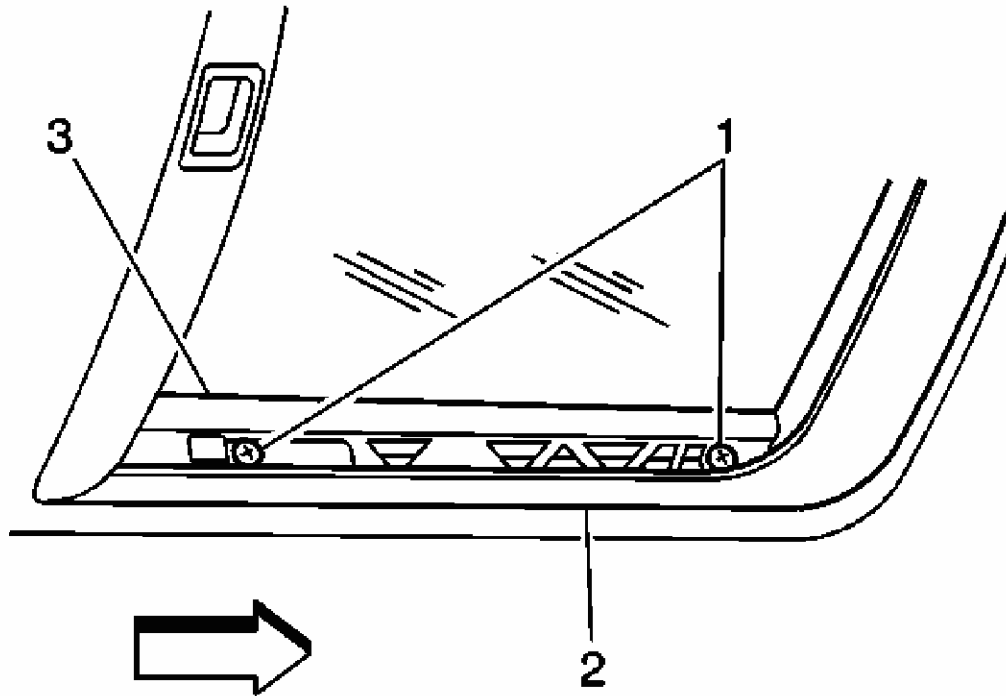


Fig. 22: Identifying Sunroof, Housing And Adjusting Screws
Courtesy of GENERAL MOTORS CORP.

4. Remove the sunroof window screws (1) from both sides.
5. Carefully lift the sunroof window from the sunroof opening.

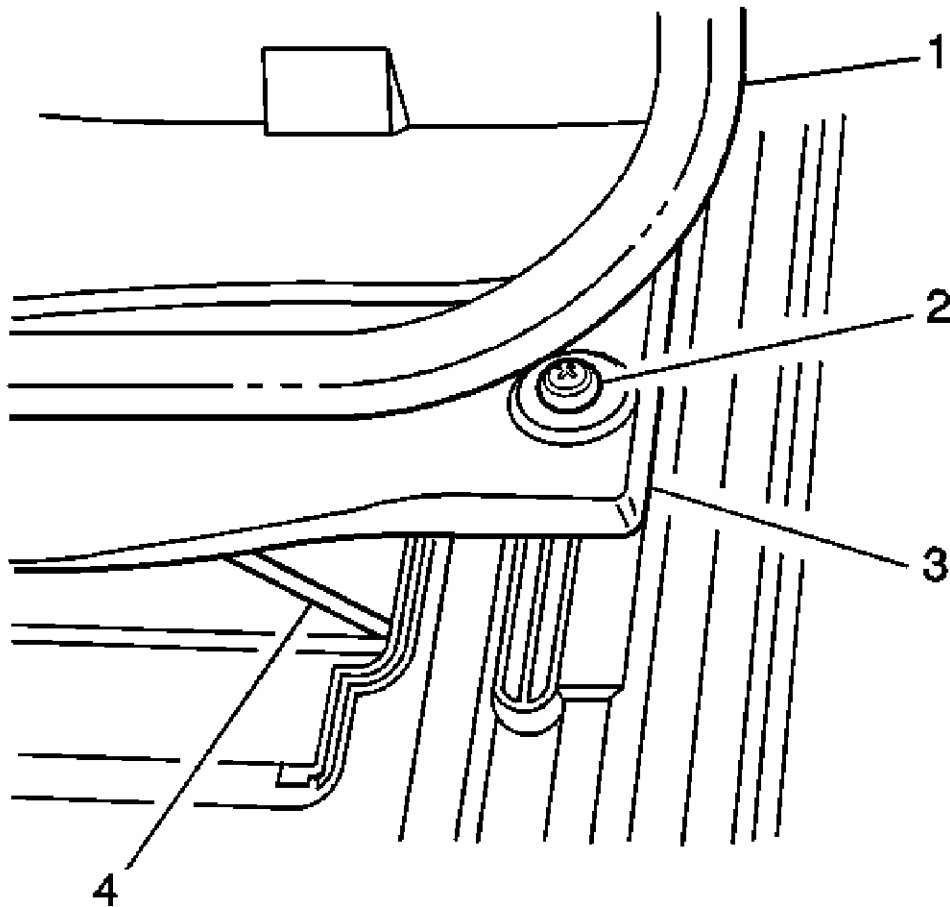


Fig. 23: Removing & Installing Screws At Each End Of The Drain Channel
Courtesy of GENERAL MOTORS CORP.

6. Remove the screws (2) from each end of the drain channel (3).
7. Move one edge of the drain channel forward.
8. Remove the drain channel from the sunroof module opening.

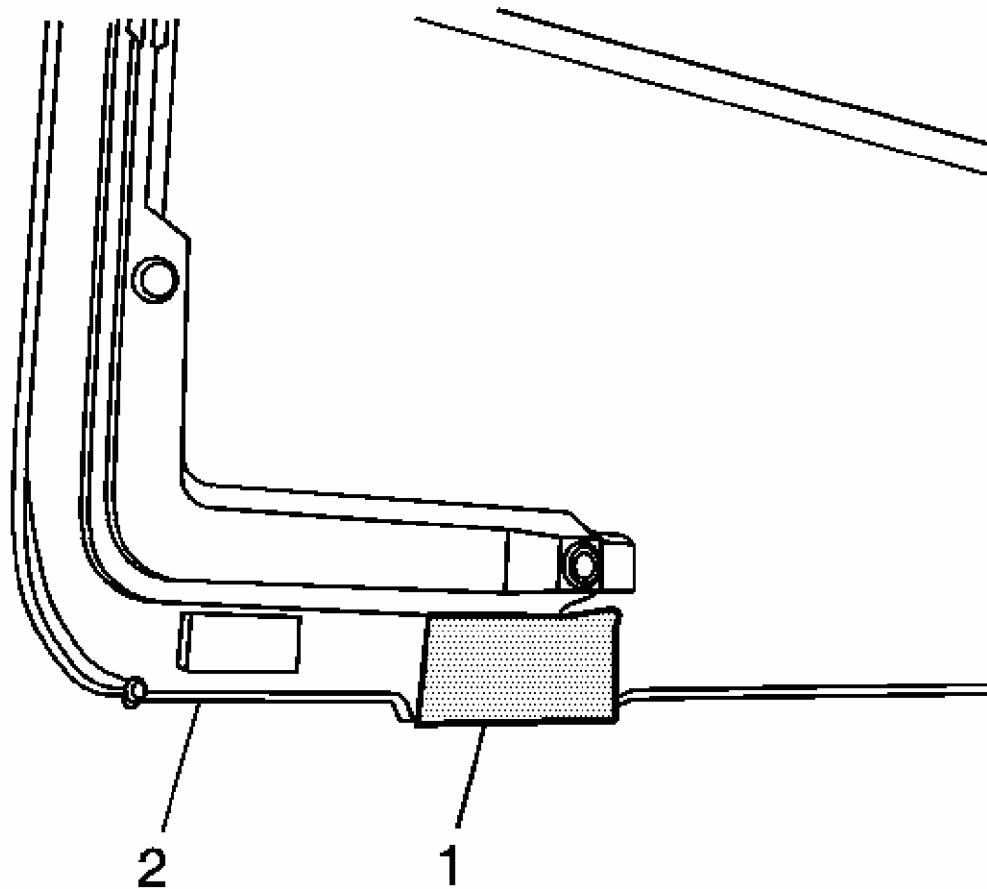


Fig. 24: Identifying Sunshade
Courtesy of GENERAL MOTORS CORP.

9. Carefully arch the sunshade upward at the forward center edge.
10. Carefully lift the front edge of the sunshade (2) upward out of the opening to release tabs from the track.
11. Slightly rotate the sunshade panel in order to remove the panel from the track assembly.
12. Carefully remove the sunshade panel upward from the sunroof module.

Installation Procedure

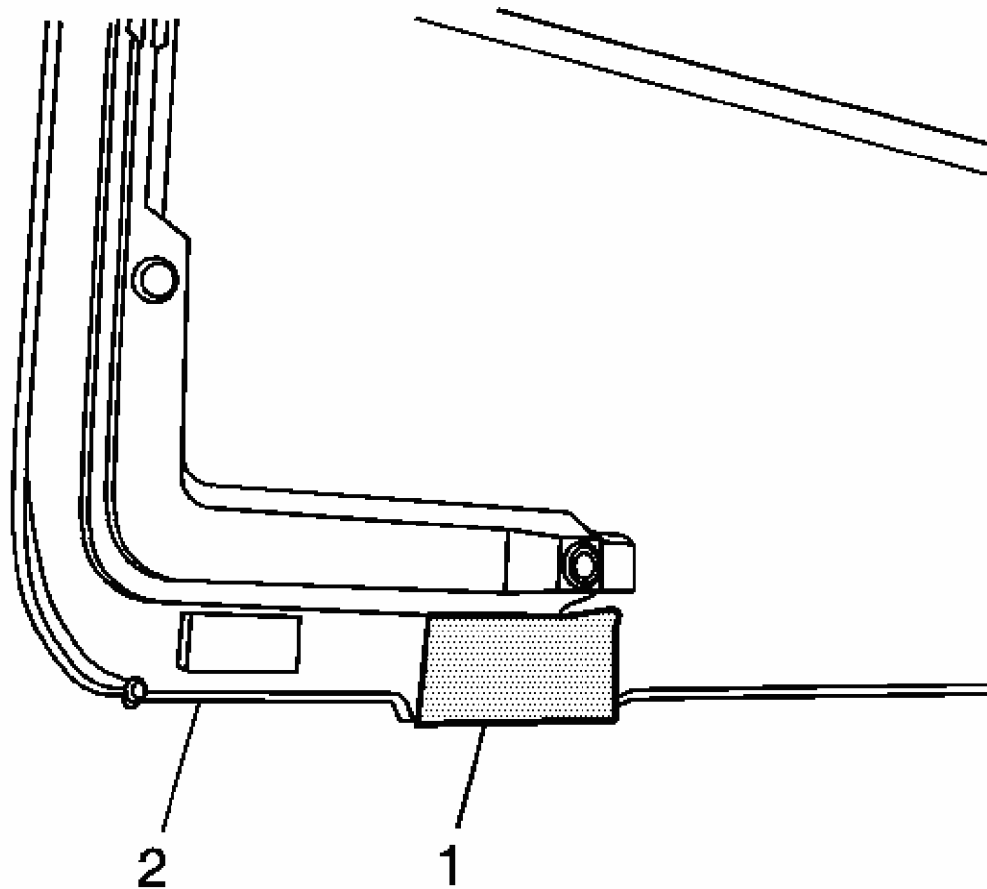


Fig. 25: Identifying Sunshade
Courtesy of GENERAL MOTORS CORP.

1. Position rear edge of the sunshade panel to the track.
2. Ensure the retention tab at the rear is positioned into the track.
3. Arch the forward edge of the sunshade (2) in order to locate the retention clip into the sunshade track.
4. Locate the tabs into the tracks and release.
5. Slide the sunshade panel forward and rearward to ensure free operation is present.

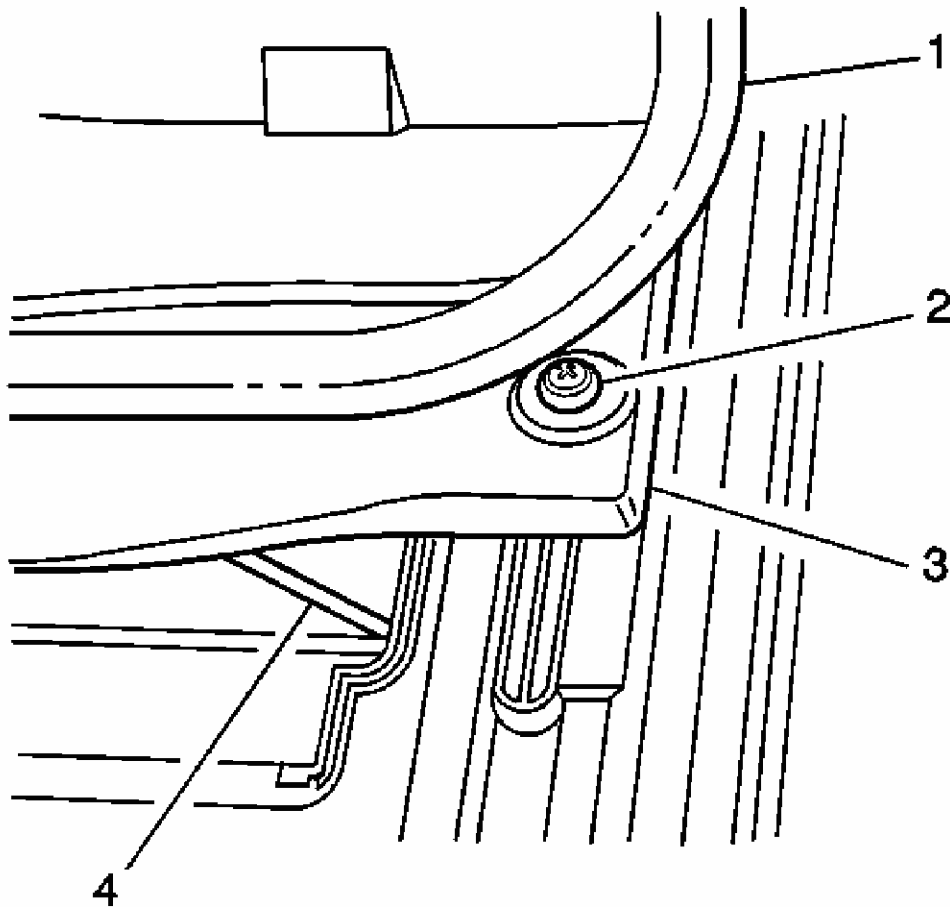


Fig. 26: Removing & Installing Screws At Each End Of The Drain Channel
Courtesy of GENERAL MOTORS CORP.

6. Position the sunroof drain channel (3) to the sunroof module (4).

NOTE: Refer to Fastener Notice .

7. Install the screws (2).

Tighten: Tighten the screws to 2 N.m (18 lb in).

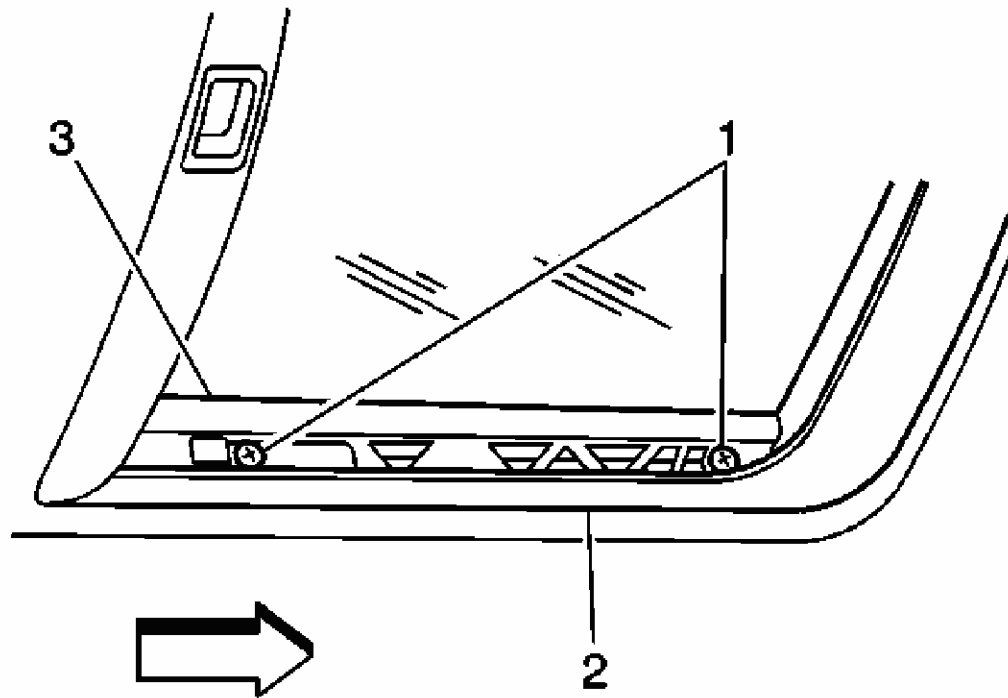


Fig. 27: Identifying Sunroof, Housing And Adjusting Screws
Courtesy of GENERAL MOTORS CORP.

8. Position the sunroof window (3) into the opening.
9. Install the sunroof window screws (1).

Tighten: Tighten the screws to 2 N.m (18 lb in).

10. Finger tighten the screws. Do Not tighten at this time.
11. Cycle the sunroof window to the closed position.
12. Adjust the sunroof window. Refer to **Sunroof Window Height and Opening Fit Adjustment**.

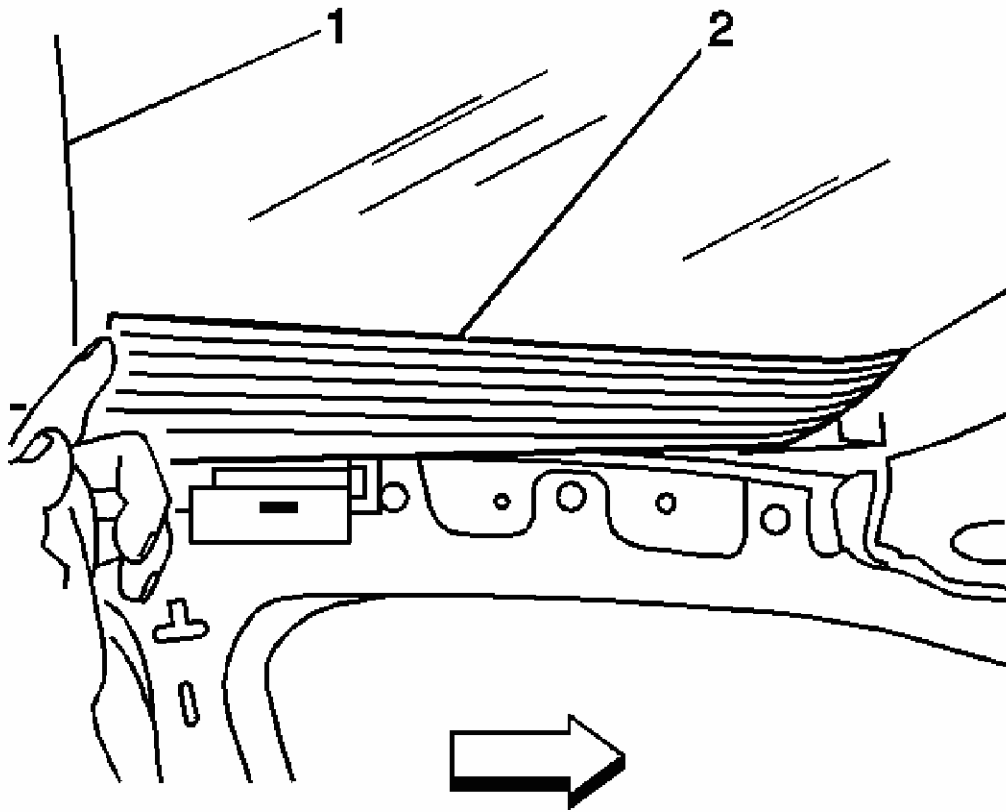


Fig. 28: Identifying Sunroof Panel Side Opening Closeout Cover
Courtesy of GENERAL MOTORS CORP.

13. Secure the sunroof panel side opening closeout covers (2) into 3 retention clips on the each side of the window.
14. Close the sunshade (1).

SUNROOF AIR DEFLECTOR REPLACEMENT

Removal Procedure

1. Cycle the sunroof window to the rear.

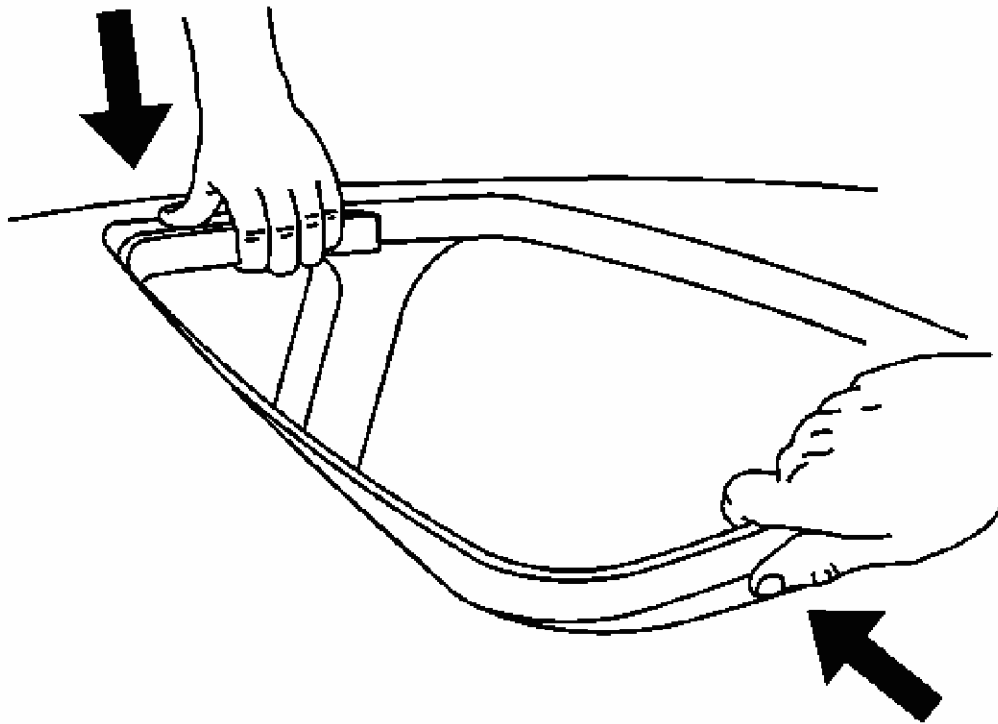


Fig. 29: View of Air Deflector
Courtesy of GENERAL MOTORS CORP.

2. Push down on the right front side of the air deflector.

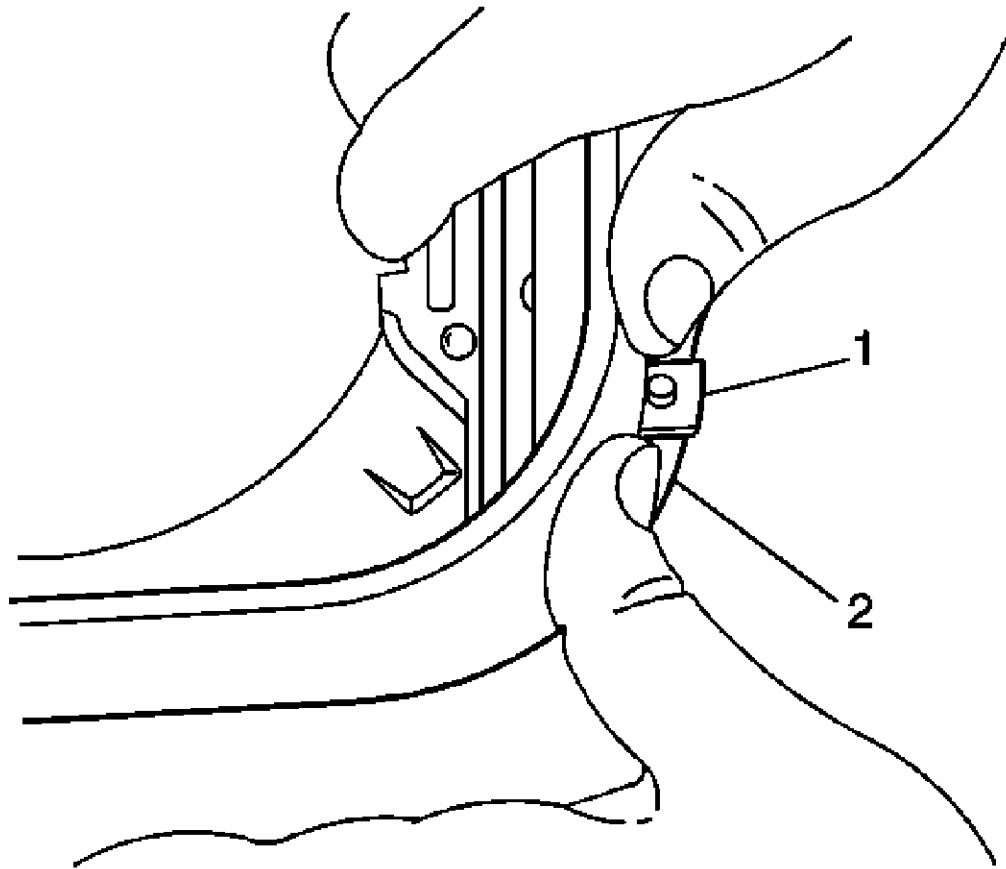


Fig. 30: View of Lower Tab & Roof Opening
Courtesy of GENERAL MOTORS CORP.

3. While holding the right side down, complete the following steps:
 1. Push the left front side of the air deflector towards the right side.
 2. Pull up on the left side until the lower tab (1) clears the roof opening (2).

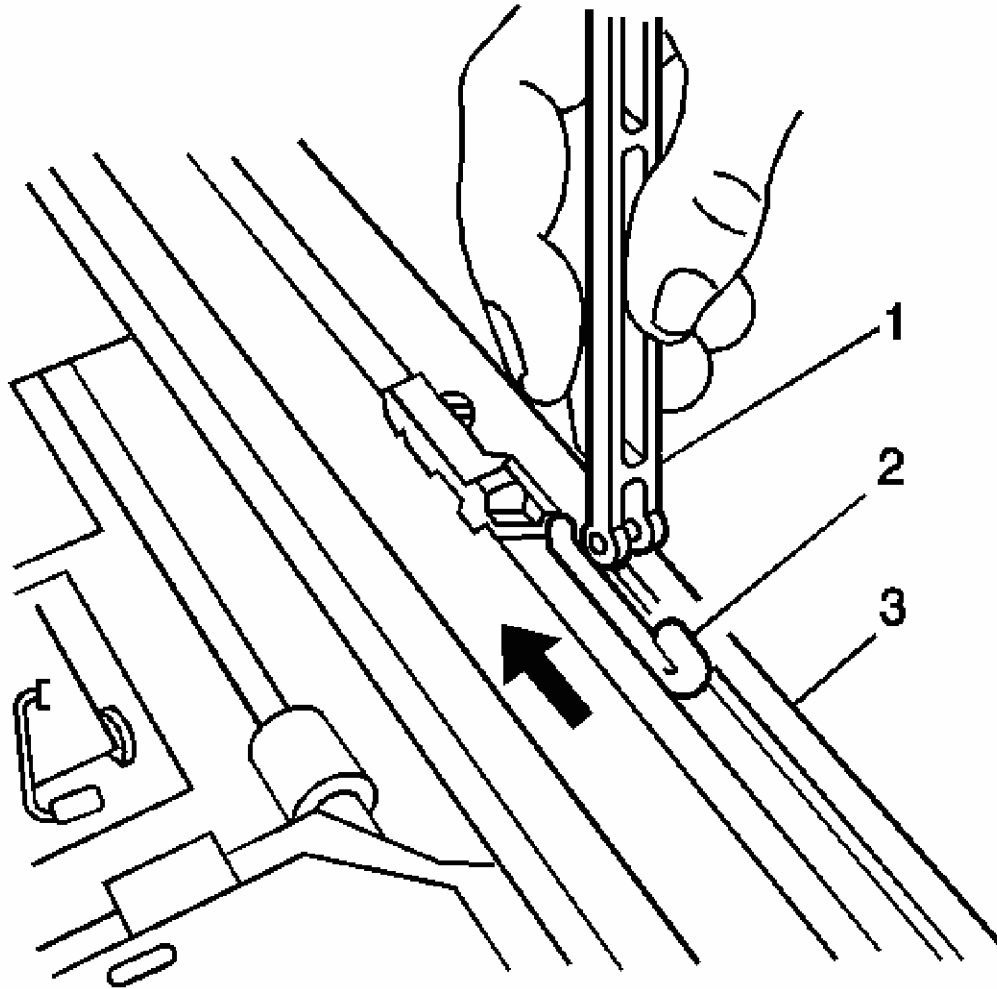


Fig. 31: View of Air Deflector & Hooks
Courtesy of GENERAL MOTORS CORP.

4. Swing the air deflector (1) in a vertical position, slide rearward, in order to disengage the air deflector from the hooks (2).
5. Remove the air deflector (1) from the sunroof module.

Installation Procedure

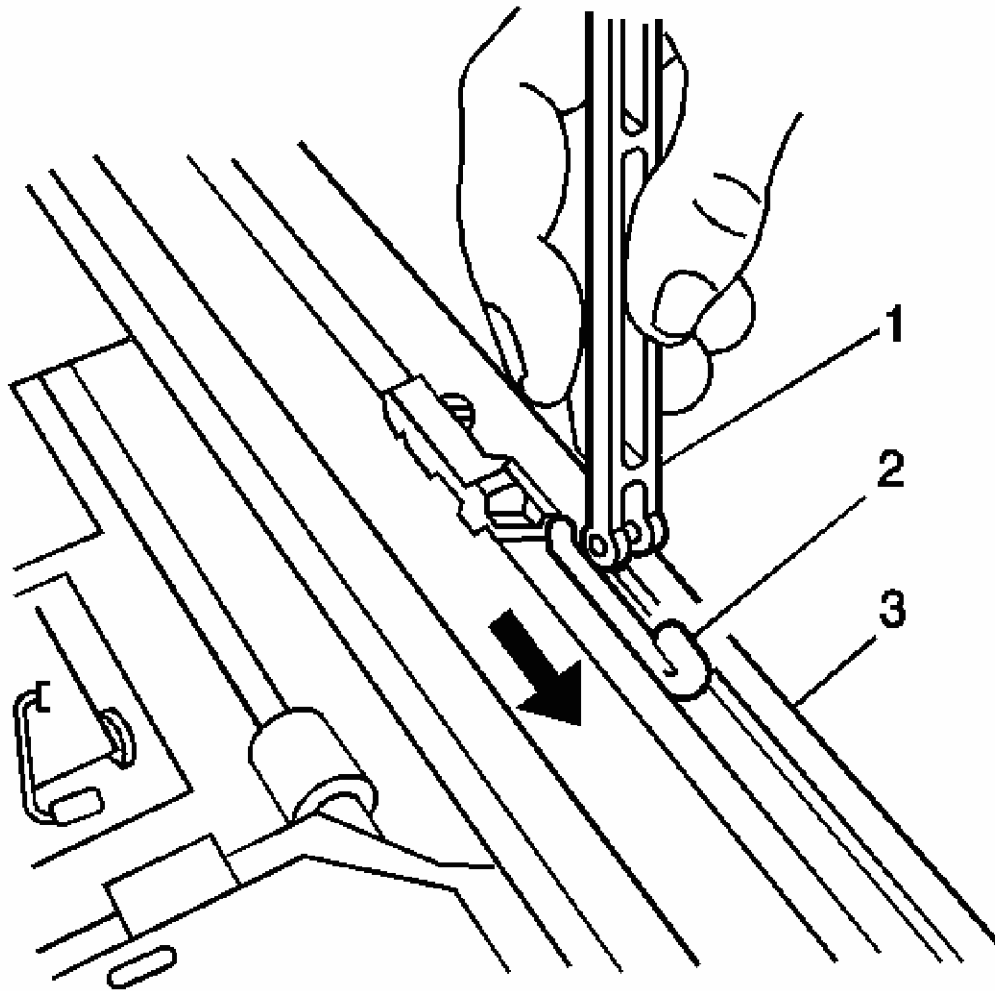


Fig. 32: View of Air Deflector, Sunroof Module, & Side Hooks
Courtesy of GENERAL MOTORS CORP.

1. Engage the rear of the air deflector (1) into the side hooks (2) on the sunroof module (3).
2. Position the air deflector forward.
3. Push the right side of the air deflector down into the roof opening.

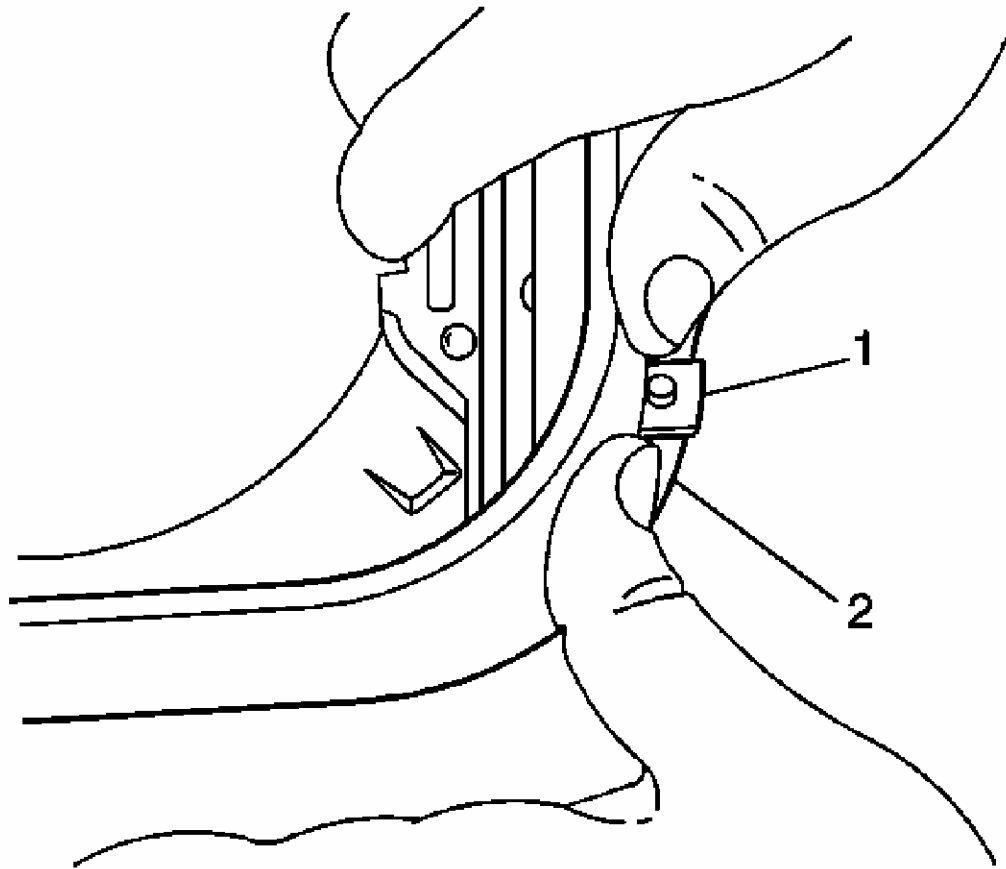


Fig. 33: View of Lower Tab & Roof Opening
Courtesy of GENERAL MOTORS CORP.

4. While holding the right side down, complete the following steps:
 1. Push the left front side of the air deflector towards the right side.
 2. Pull up on the left side until the lower tab (1) clears the roof opening.

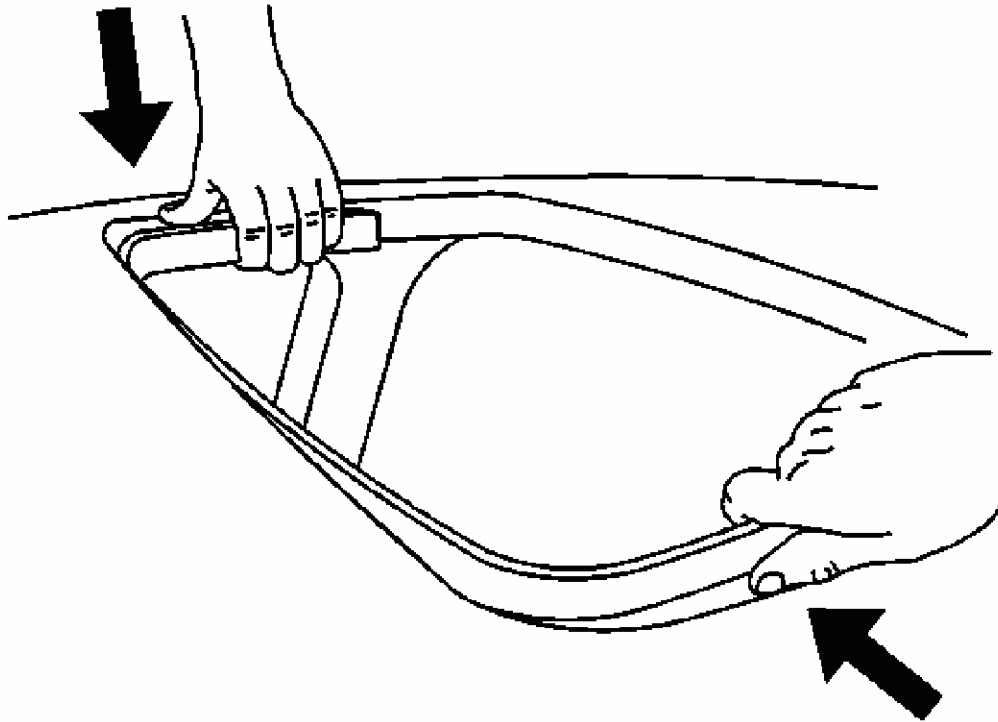


Fig. 34: View of Air Deflector
Courtesy of GENERAL MOTORS CORP.

5. Push the left front side of the air deflector inwards and down so the tab clears the roof opening.
6. Close the sunroof window.

SUNROOF PANEL SIDE OPENING COVER REPLACEMENT

Removal Procedure

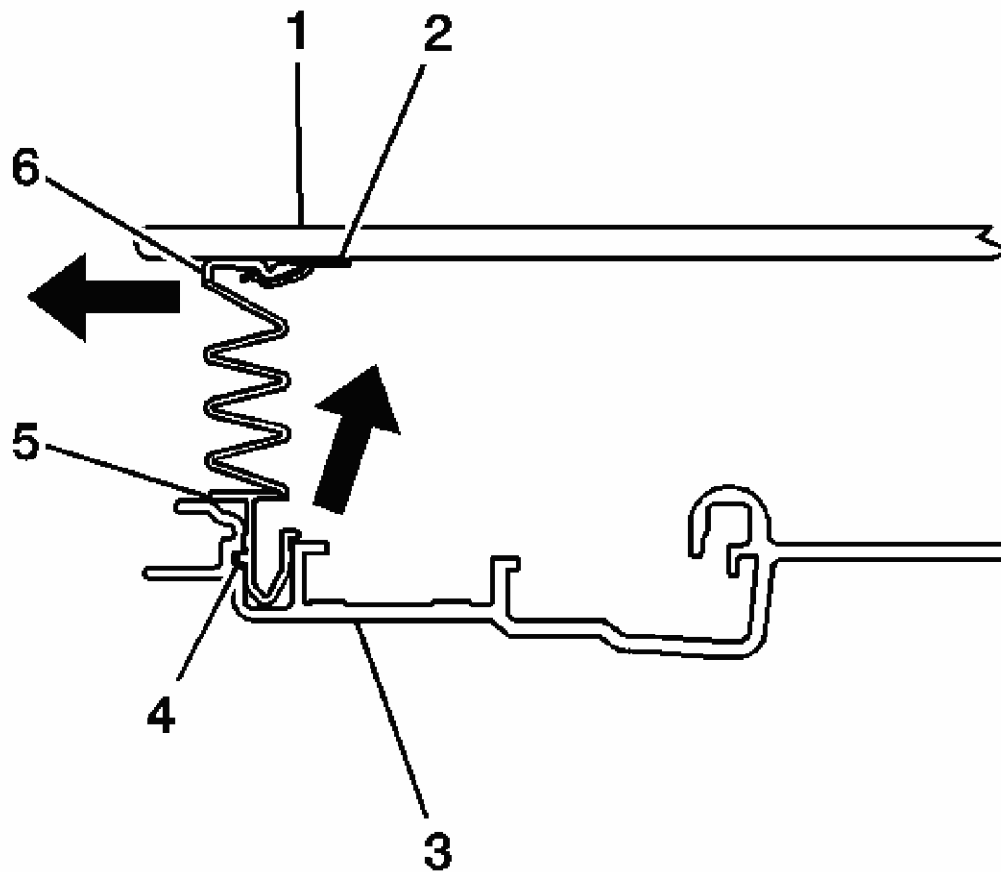


Fig. 35: Removing/Installing Sunroof Panel Side Opening Cover
Courtesy of GENERAL MOTORS CORP.

1. Open the sunshade to the full rearward position.
2. Open the sunroof window (1) to the vent position.
3. Detach both sides of the sunroof side opening closeout panel covers (6) from the sunroof window clips (2).
4. Open the sunroof to the full open position.
5. Using a flat-bladed tool, press the locking tab (4) outward, from inside the roof opening, in order to detach the side opening closeout panel cover from the sunroof track channel (3).
6. With the lock tab (4) depressed, lift the front edge of the side opening closeout panel cover from the track, working towards the rear of the sunroof opening.
7. Repeat the steps for the entire length of the side opening closeout panel cover (6).
8. Remove the sunroof side opening closeout panel cover from the sunroof module track

assembly.

Installation Procedure

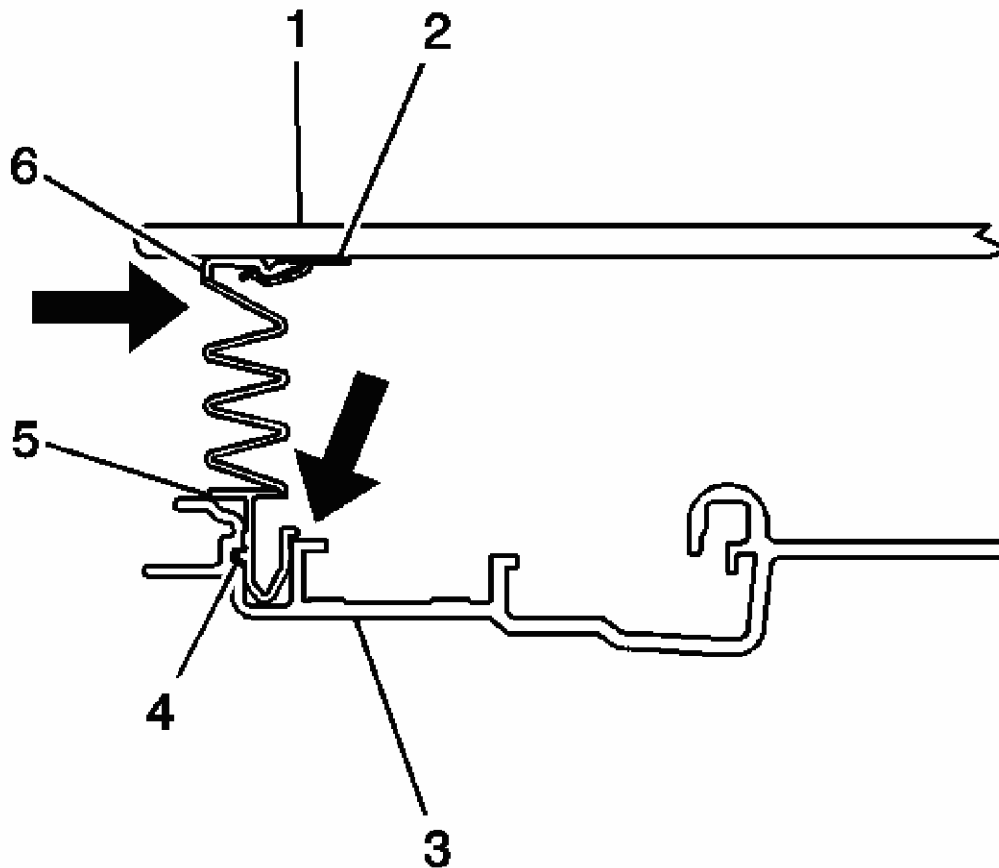


Fig. 36: Installing & Installing Sunroof Panel Side Opening Cover
Courtesy of GENERAL MOTORS CORP.

1. Place in position, the new sunroof side opening closeout panel cover (6) to the sunroof module track assembly (3).
2. Hold the lower part (5) of the side opening closeout panel cover firmly and press the locking tab (4) into the track assembly.
3. Ensure the entire length of the side opening closeout panel cover (6) is secure to the sunroof assembly track.
4. Close the sunroof window (1).
5. Open the sunroof window to the vent position.
6. Secure the sunroof side opening closeout panel cover (6) to the 3 clips (2) located on the

inside edge of the sunroof window.

7. Close the sunroof window.
8. Cycle the sunroof window to the vent position and full open positions in order to ensure the sunroof side opening closeout panel covers are secure to the attachment clips.
9. Close the sunroof window.
10. Close the sunshade.

SUNROOF WINDOW REPLACEMENT

Removal Procedure

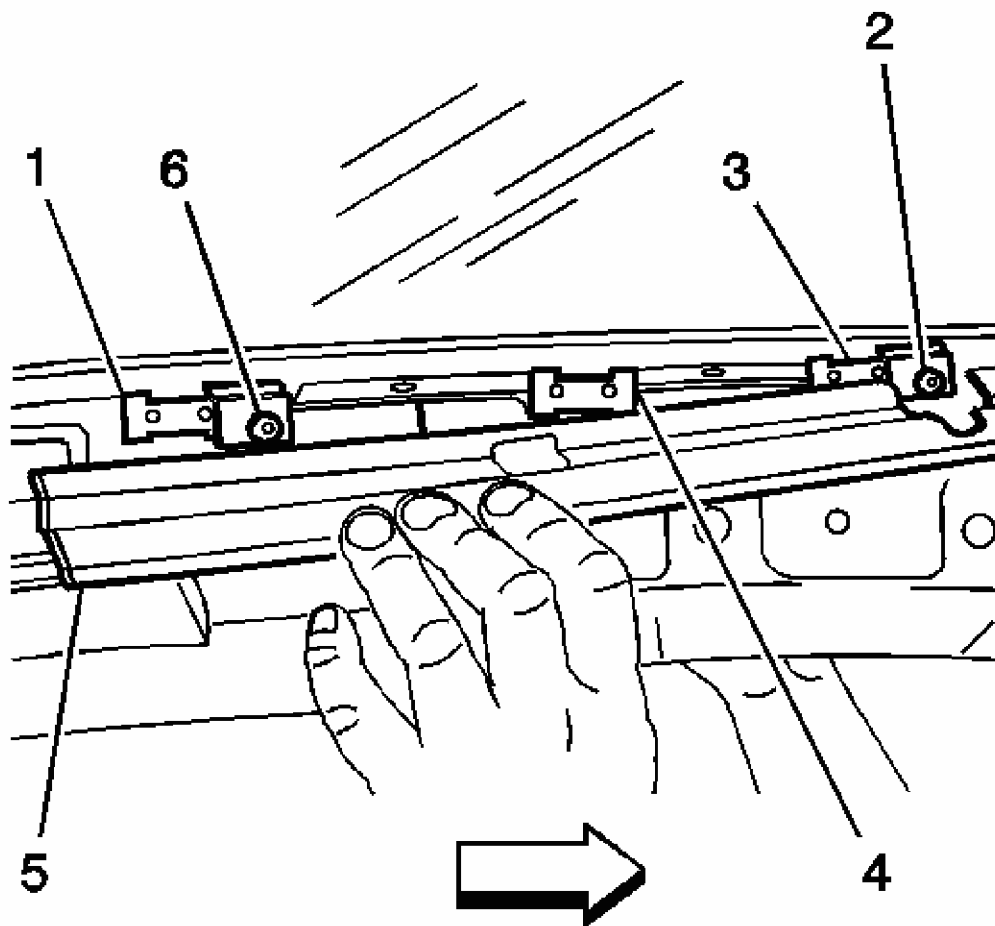


Fig. 37: Identifying Sunroof Panel Side Opening Closeout Panel Cover
Courtesy of GENERAL MOTORS CORP.

NOTE: In order to prevent damage to the paint, mask the roof panel in front of the sunroof opening using masking tape and paper.

1. Cycle the sunroof window to the vent position.
2. Slide the sunshade rearward.
3. Disconnect the sunroof panel side opening closeout covers (5) from the sunroof window clips (1,3,4) in order to access the window screws (2,6).
4. Tape the sunroof panel side opening closeout covers in a downward position.

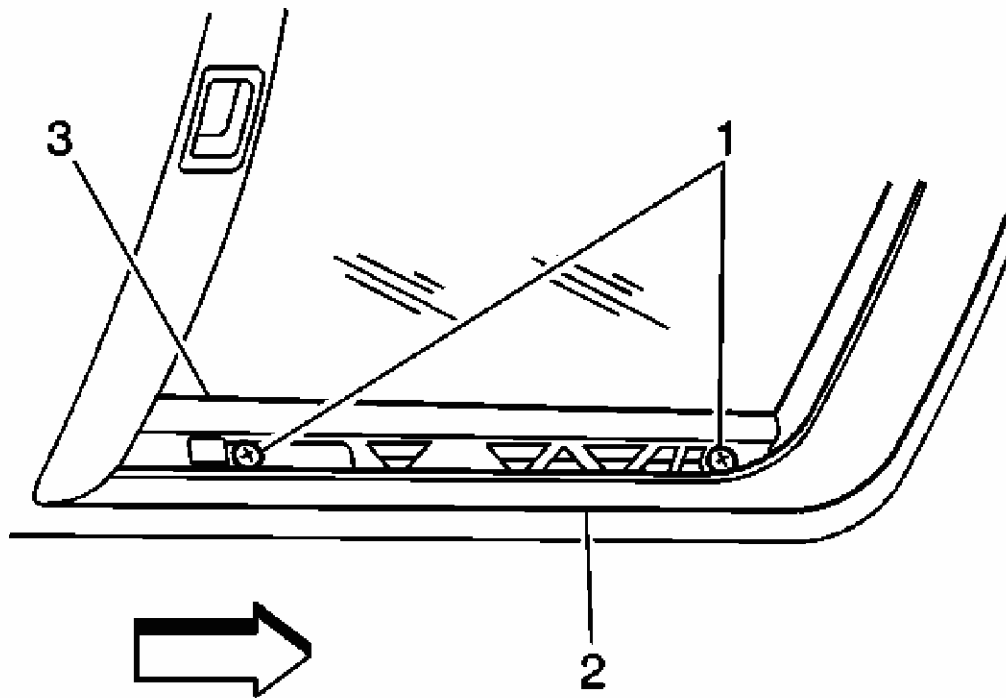


Fig. 38: Identifying Sunroof, Housing And Adjusting Screws
Courtesy of GENERAL MOTORS CORP.

5. Remove the sunroof window screws (1) on both sides.

IMPORTANT: Be careful not to scratch the roof surface or the sunroof window.

6. Lift the sunroof window (3) from the sunroof opening.

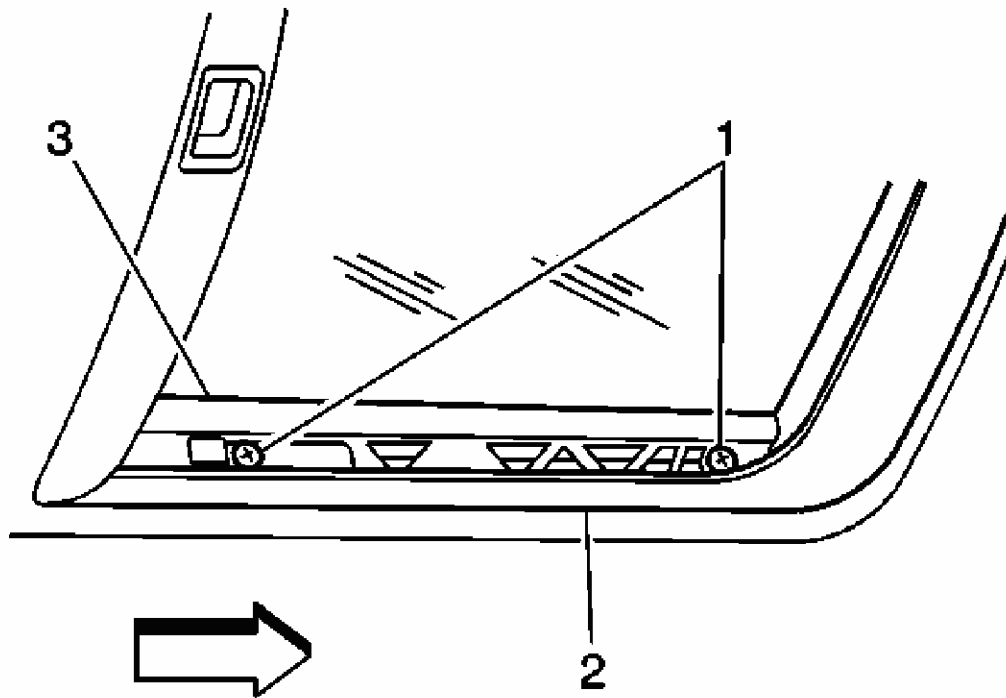
Installation Procedure

Fig. 39: Identifying Sunroof, Housing And Adjusting Screws
Courtesy of GENERAL MOTORS CORP.

1. Position the sunroof window (3) into the opening, with the window trade mark pointing rearward.
2. Install the sunroof window screws (1).
3. Finger tighten the screws, do not tighten.
4. Carefully close the sunroof window from the vent position to the full closed position.

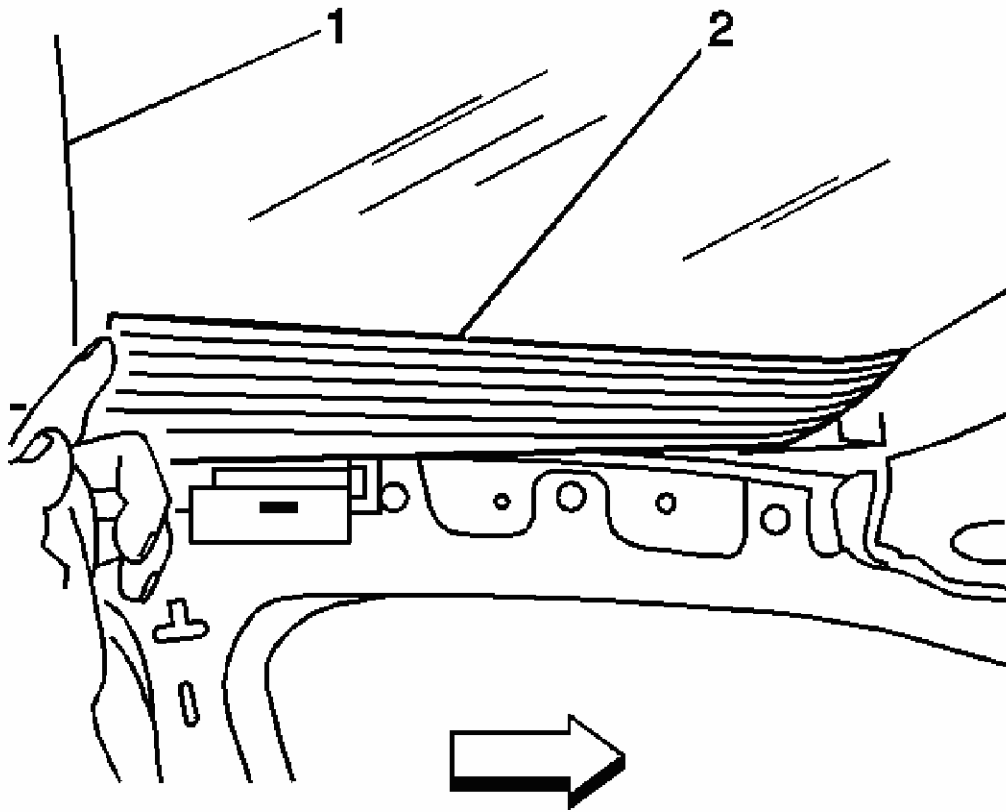


Fig. 40: Identifying Sunroof Panel Side Opening Closeout Cover
Courtesy of GENERAL MOTORS CORP.

5. Adjust the sunroof window. Refer to **Sunroof Window Height and Opening Fit Adjustment**.
6. Connect the sunroof panel side opening closeout covers (2) to the sunroof window clips.
7. Snap the sunroof panel side opening closeout covers into the sunroof window retention clips.
8. Close the sunshade.
9. Cycle the sunroof window to ensure proper operation and fit.

SUNROOF SWITCH REPLACEMENT

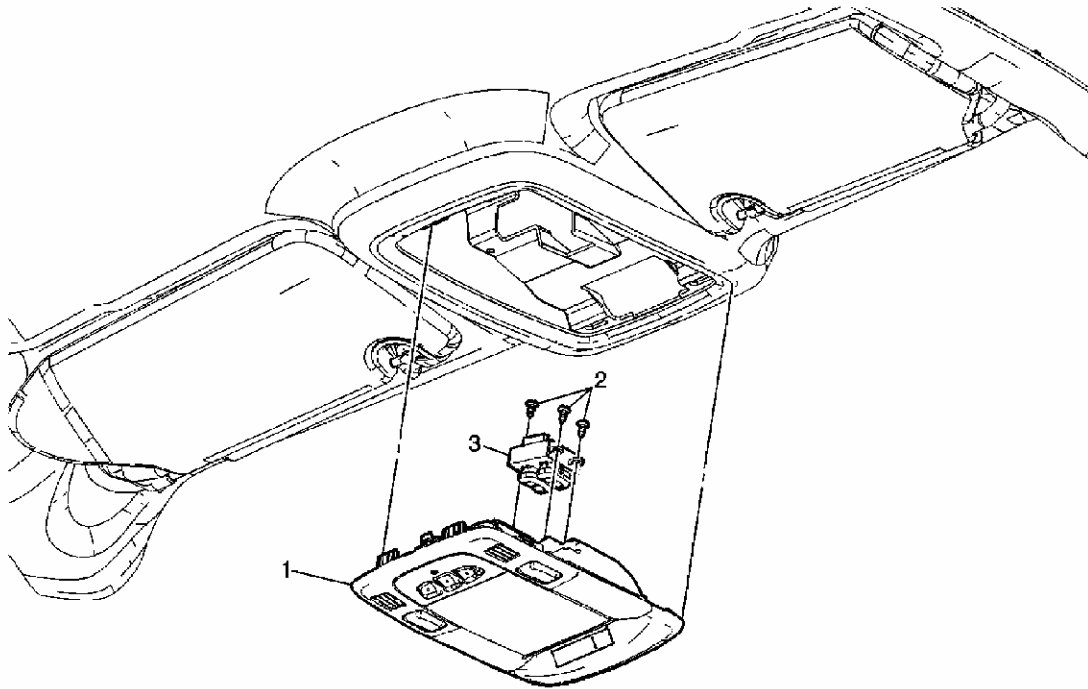


Fig. 41: Removing/Installing Sunroof Switch
 Courtesy of GENERAL MOTORS CORP.

Sunroof Switch Replacement

Callout	Component Name
NOTE: Refer to <u>Fastener Notice</u> .	
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
1	Overhead Console Assembly Refer to <u>Roof Console Replacement</u> .
2	Sunroof Switch Screw (Qty: 3) Tighten: 2 N.m (18 lb in)
3	Sunroof Switch Assembly Tip: Disconnect the electrical connector.

SUNROOF MOTOR/ACTUATOR REPLACEMENT (SMART MOTOR)

Removal Procedure

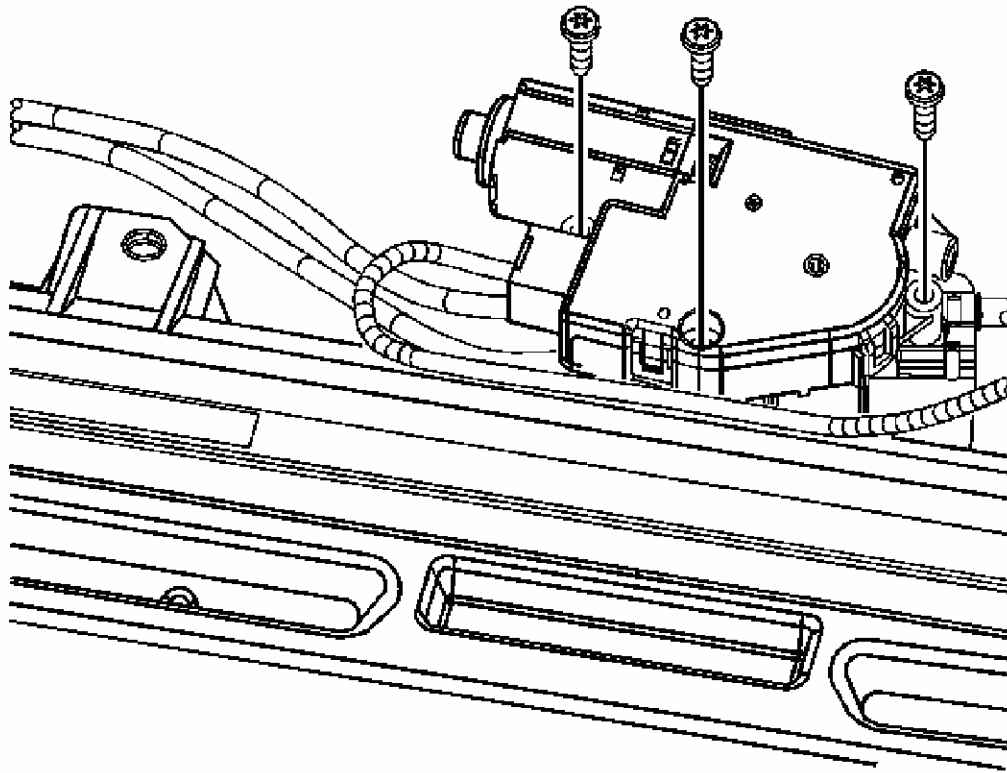


Fig. 42: View Of Sunroof Motor/Actuator, Electrical Connector & Screws
Courtesy of GENERAL MOTORS CORP.

1. Lower the headliner in order to access the sunroof motor/actuator. Refer to **Headlining Trim Panel Replacement** in Interior Trim.
2. Disconnect the electrical connector.
3. Remove the screws securing the sunroof motor/actuator to the module.

Installation Procedure

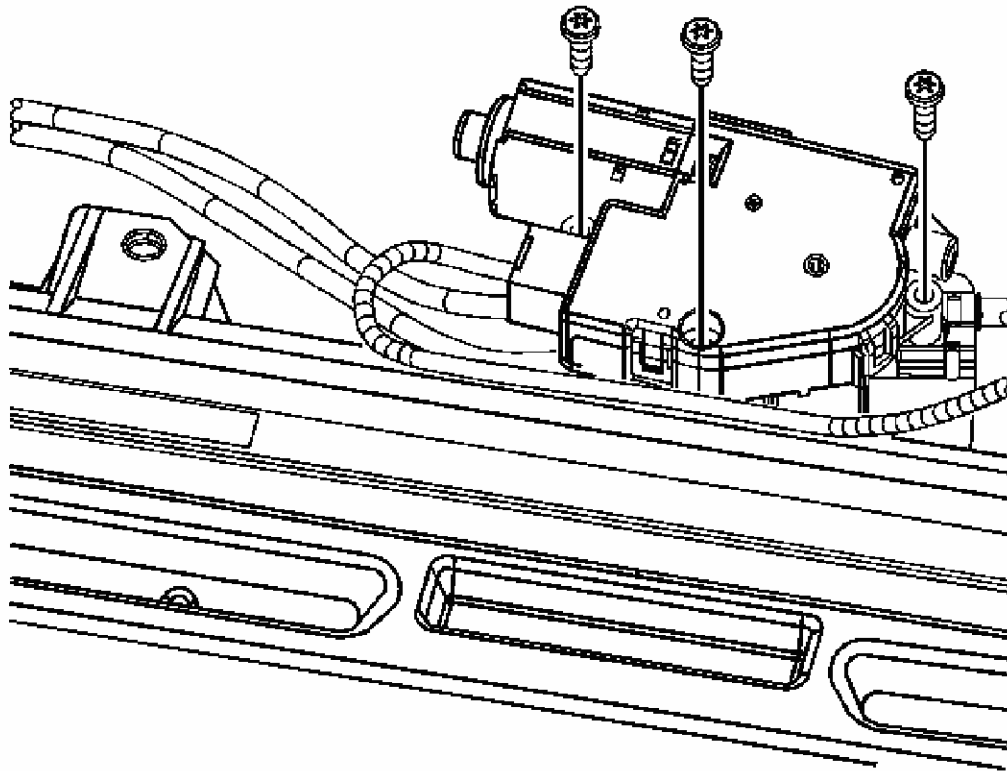


Fig. 43: View Of Sunroof Motor/Actuator, Electrical Connector & Screws
Courtesy of GENERAL MOTORS CORP.

1. Install the sunroof motor/actuator to the sunroof module.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

2. Install the sunroof motor/actuator screws.

Tighten: Tighten the screws to 6 N.m (53 lb in).

3. Connect the electrical connector.
4. Verify the sunroof operation.
5. Initialization/Teach the sunroof motor. Refer to Sunroof Motor/Actuator Initialization/Teach Process.
6. Install the headliner. Refer to Headlining Trim Panel Replacement in Interior Trim.
7. Refer to Control Module References for programming and setup information.

SUNROOF MOTOR/ACTUATOR INITIALIZATION/TEACH PROCESS

Perform the initialization/teach procedure any time:

- A new sunroof motor/actuator has been installed.
- The existing sunroof motor/actuator has been removed and reinstalled.
- The battery voltage has been interrupted during sunroof operation.
- Attempts to operate the sunroof switch with the ignition ON and the battery voltage supply open or fuse open to the sunroof motor/actuator.
- The sunroof operates erratically.

By performing the initialization/teach procedure, the sunroof motor/actuator records the open vent soft stop position. The motor/actuator will then understand the other positions, closed and full open soft stop and allow express and obstacle detection functions.

Initialization/Teach Procedure

1. Ensure that all electrical harness connectors are connected.
2. Turn the ignition to ON.
3. Press and hold the sunroof switch to the vent open position until the sunroof window stops, then release the switch.
4. Press and hold the sunroof switch in the vent open position. The window should stall at the hard stop, then lower slightly to the soft stop position. Continue holding the switch for at least 5 seconds, then release the switch.
5. If the window did stall at the vent open hard stop and lower slightly, go to step 6. If the window did not stall at the vent open hard stop and lower slightly, repeat step 4.

IMPORTANT: The initialization/teach procedure is not complete if the battery and/or ignition power has been interrupted during the process.

The Initialization/Teach Process must be restarted if the procedure is not carried out completely.

6. Verify the operation of the sunroof in all positions.

SUNROOF MODULE ASSEMBLY REPLACEMENT**Removal Procedure**

IMPORTANT: A new sunroof module assembly will not have the sunroof window, sunshade, deflector and motor/actuator as components of the new service part. The old sunroof

components will need to be transferred to the new sunroof module assembly.

The old sunroof window and sunshade will need to be installed to the new sunroof module assembly.

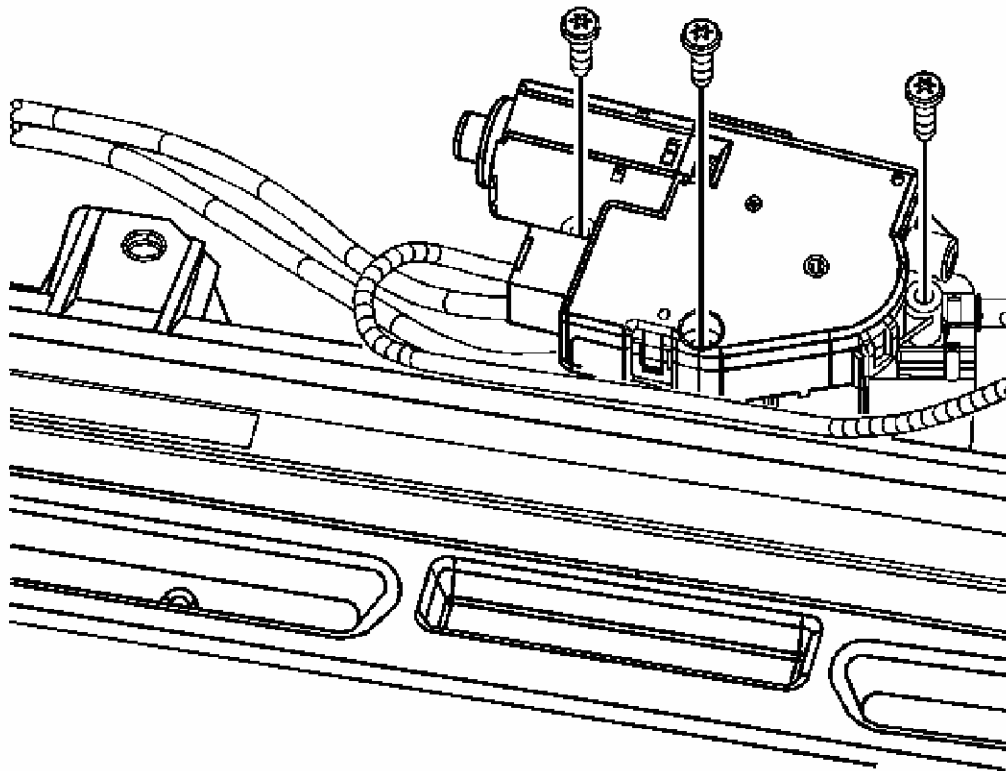


Fig. 44: View Of Sunroof Motor/Actuator, Electrical Connector & Screws
Courtesy of GENERAL MOTORS CORP.

1. Remove the sunroof window. Refer to Sunroof Window Replacement.
2. Remove the sunshade panel. Refer to Sunroof Sunshade Replacement.
3. Remove the air deflector. Refer to Sunroof Air Deflector Replacement.

IMPORTANT: It is only necessary to lower the headliner. Only do the steps in headliner replacement that will lower the headliner enough to gain access.

4. Lower the headliner. Refer to Headlining Trim Panel Replacement.
5. Remove the sunroof motor/actuator. Refer to Sunroof Motor/Actuator Replacement.

(Smart Motor).

6. Cut the tie straps securing the electrical harness to the sunroof cable rear drive tube.

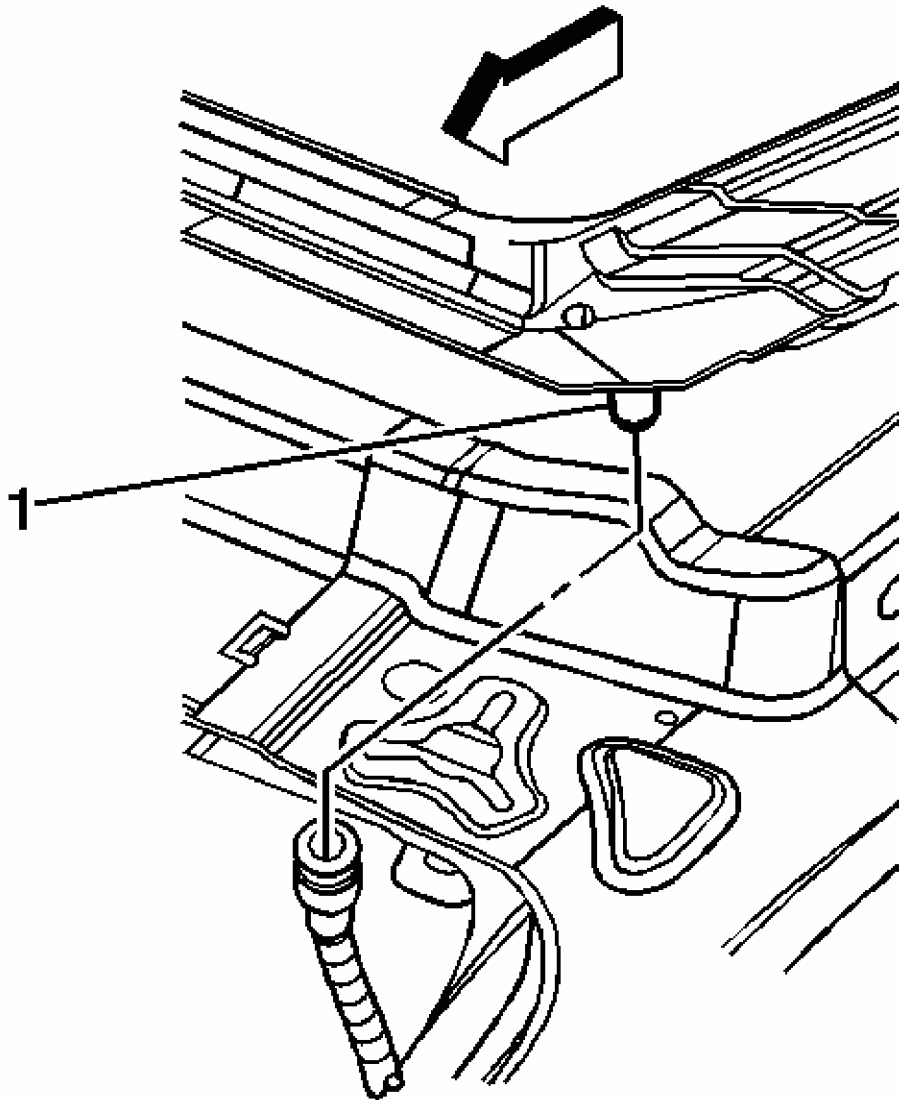


Fig. 45: Identifying Drain Spout
Courtesy of GENERAL MOTORS CORP.

7. Disconnect the drain hoses from the front sunroof module drain spouts (1).

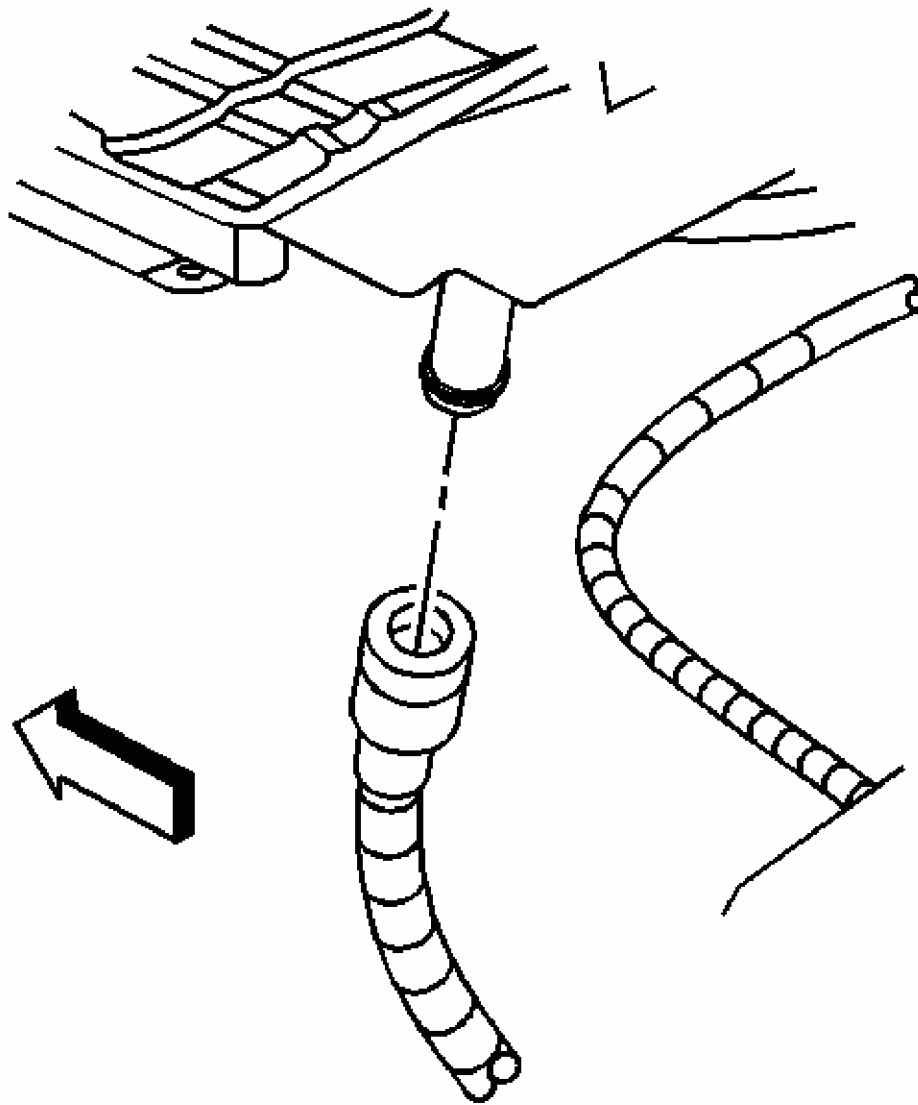


Fig. 46: Identifying Drain Hose At Drain Spout On Rear Of The Sunroof Module
Courtesy of GENERAL MOTORS CORP.

8. Disconnect the drain hoses from the rear sunroof module drain spouts.

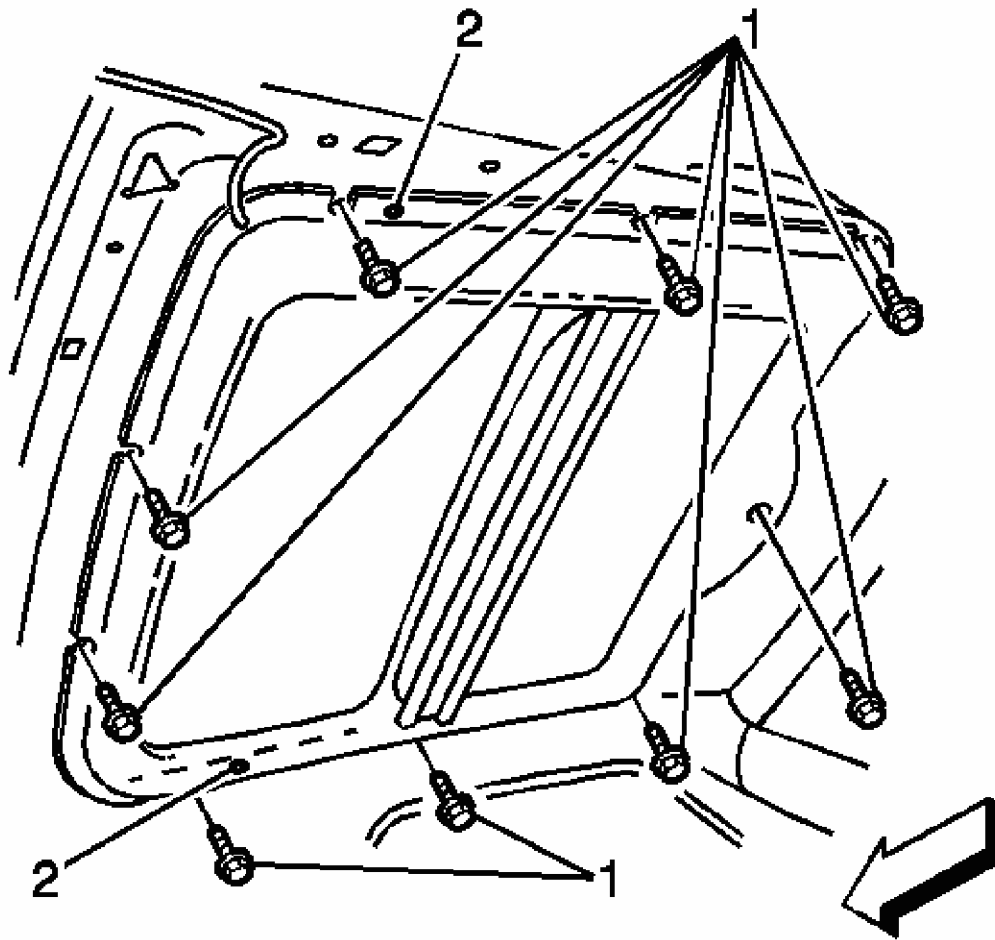


Fig. 47: Removing & Installing Sunroof Module-To-Roof Bolts
Courtesy of GENERAL MOTORS CORP.

9. Remove the sunroof module to the roof bolts (1).
10. Remove the 2 center, side to side, bolts last in order to help support the sunroof module to the roof ring.
11. Remove the last 2 sunroof to roof ring bolts.
12. With an assistant, lower and remove the sunroof module assembly out the passenger side door.

Installation Procedure

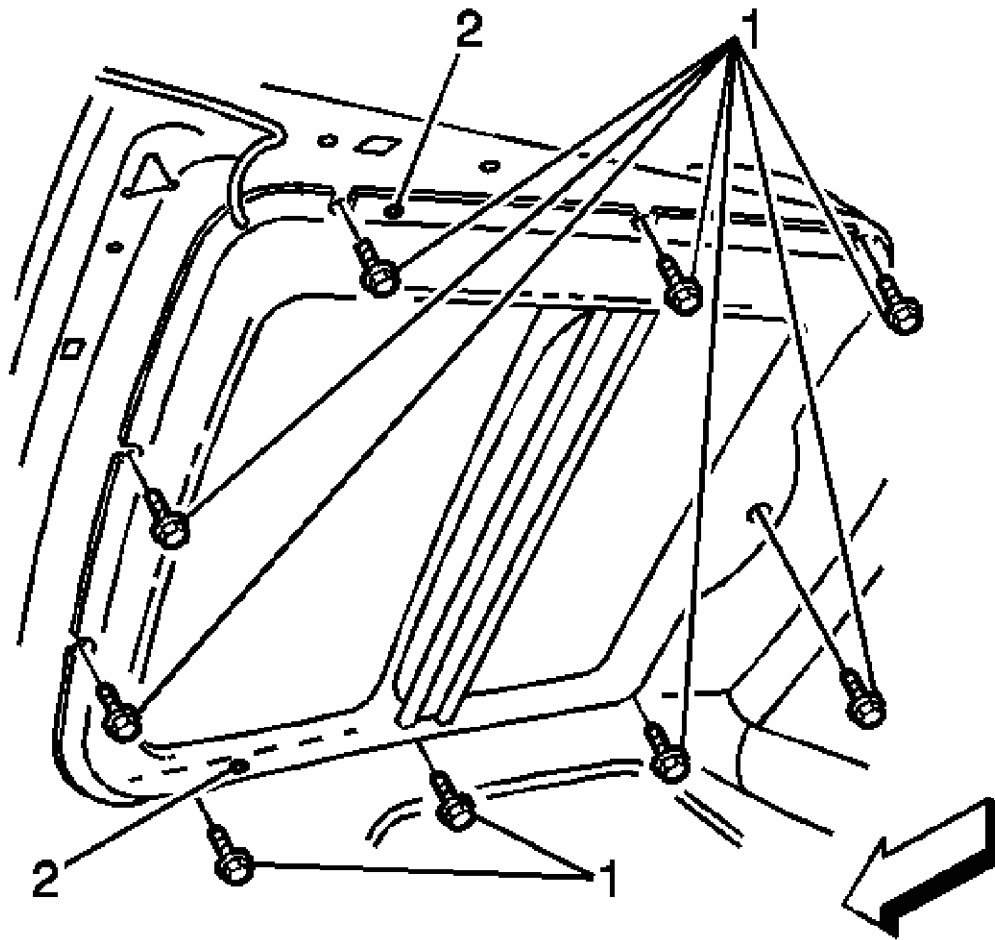


Fig. 48: Removing & Installing Sunroof Module-To-Roof Bolts
Courtesy of GENERAL MOTORS CORP.

1. With an assistant, position the new sunroof module assembly into the alignment pins (2) located on the roof ring.
2. Hand start the 2 center, side to side, sunroof module assembly to roof bolts (1) in order to hold the sunroof module into place.
3. Finger tighten the 2 center bolts.

NOTE: Refer to Fastener Notice .

4. Install the remaining sunroof module to roof bolts.

Tighten: Tighten all of the bolts to 9 N.m (80 lb in).

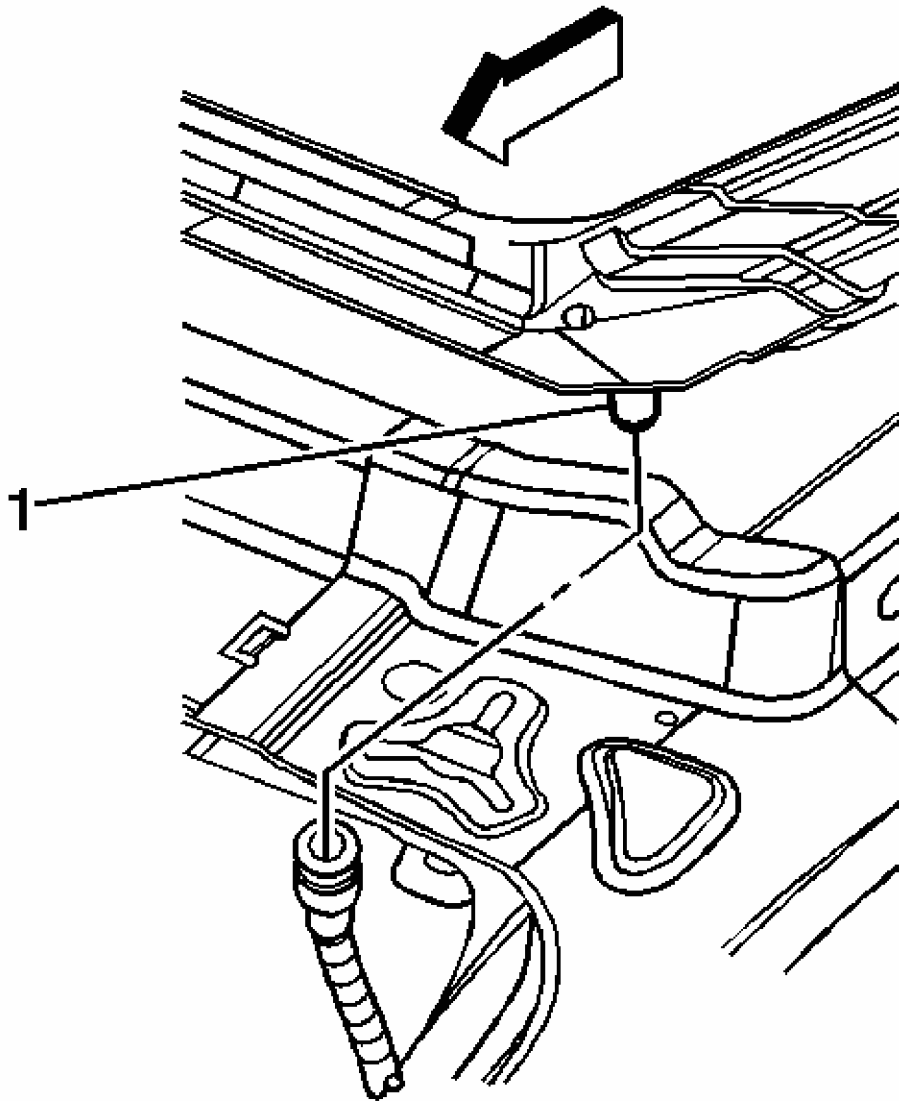


Fig. 49: Identifying Drain Spout
Courtesy of GENERAL MOTORS CORP.

5. Connect the front and rear drain hoses to the drain spouts (1) on the sunroof module.

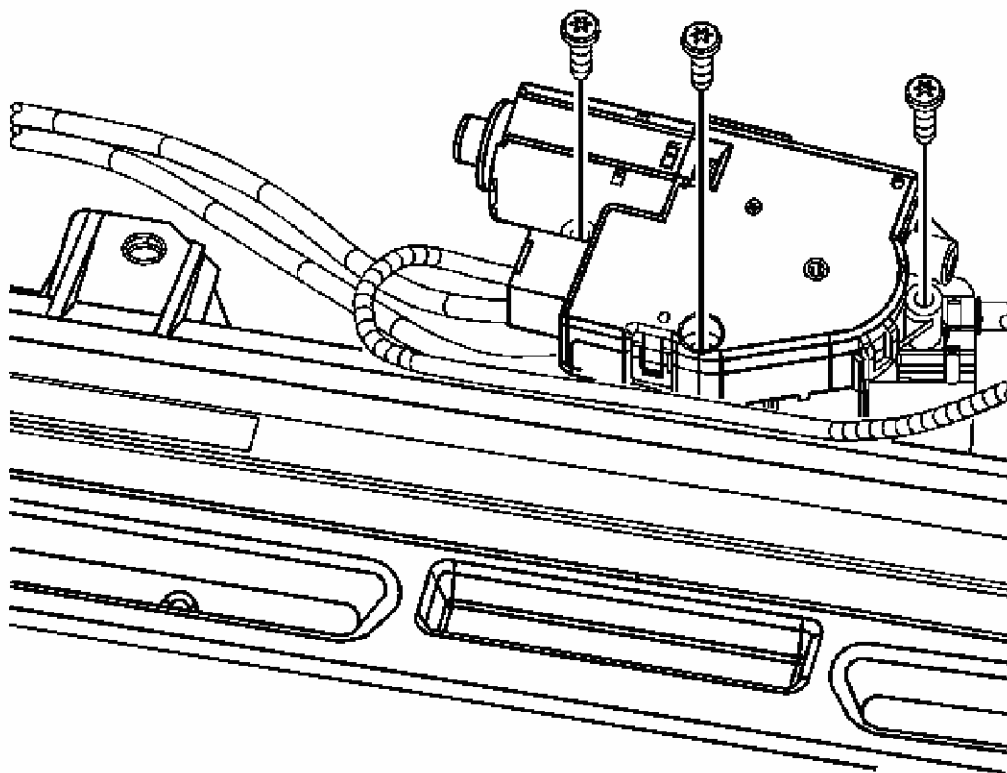


Fig. 50: View Of Sunroof Motor/Actuator, Electrical Connector & Screws
Courtesy of GENERAL MOTORS CORP.

6. Install sunroof motor/actuator to the module.
7. Install the screws to the motor/actuator.

Tighten: Tighten all of the bolts to 6 N.m (53 lb in).

8. Connect the electrical connector to the sunroof motor/actuator.
9. Secure the harness with suitable straps.
10. Install the air deflector. Refer to **Sunroof Air Deflector Replacement**.
11. Install the sunshade. Refer to **Sunroof Sunshade Replacement**.
12. Install the sunroof window and loosely install the screws. Refer to **Sunroof Window Replacement**.
13. Adjust the sunroof window. Refer to **Sunroof Window Height and Opening Fit Adjustment**.
14. Verify the proper operation of the sunroof before securing the headliner.

15. Initialization/Teach the sunroof motor. Refer to **Sunroof Motor/Actuator Initialization/Teach Process**.
16. Raise and install the headliner, with the aid of an assistant. Refer to **Headlining Trim Panel Replacement**.

DESCRIPTION AND OPERATION

SUNROOF DESCRIPTION AND OPERATION

Power Sunroof System Components

The power sunroof system consists of the following components:

- Sunroof motor/actuator assembly
- Sunroof switch
- Sunroof glass, tilt/slide style, with glass sliding between the headliner and roof
- Rail and track assembly upon which the sunroof glass rides
- S/ROOF Fuse 25 A
- RAP Fuse 10 A

Power and Grounds

Battery positive voltage is supplied at all times to the sunroof motor/actuator assembly from the 25 A S/ROOF fuse located in the rear fuse block. This voltage is used to power the sunroof motor. Accessory voltage is applied to the sunroof motor/actuator assembly from the 10 A RAP fuse also located in the rear fuse block. This voltage is used to power the logic within the motor/actuator assembly and to allow sunroof operation only with the ignition in the run or accessory positions. Ground is supplied to the sunroof motor/actuator assembly through the ground circuit and G403.

Ground is supplied to the sunroof switch through the switch ground circuit and G402.

Power Sunroof Operation

The Power Sunroof System will operate only with the ignition turned to the RUN or Accessory positions, this allows for retained accessory power (RAP) control of the sunroof. Once the ignition switch is turned to OFF the sunroof will continue to operate until any door is opened or when the RAP timer reaches its shut-off limit. For a description and operation of the RAP operation, refer to **Retained Accessory Power (RAP) Description and Operation**.

Sunroof Switch

The sunroof switch assembly contains two rocker type switches that are used to control the following sunroof functions:

- Roof open/close-A supervised press to the first detente of the switch
- Roof express open/close-A momentary press to the second detente of the switch
- Vent open/close-A supervised press to the first detente of the switch
- Vent express open/close-A momentary press to the second detente of the switch

When the sunroof express open switch is pressed to the second detente, the roof will open to the comfort stop position, approximately 3/4 of the full open position. Press the roof express open switch a second time, the roof will then move to the full open position.

The sunroof switch can be used to control roof movement in an assortment of different ways from any one of the following positions:

- Press and hold the roof open switch to the first detente or momentarily to the second detente, the roof will move the as follows:
 - From the roof closed position to the roof open position
 - From the vent open position to the roof open position
- Press and hold the roof close switch to the first detente or momentarily to the second detente, the roof will move the as follows:
 - From the roof open position to the roof closed position
 - From the vent open position to the roof closed position
- Press and hold the vent open switch to the first detente or momentarily to the second detente, the roof will move as follows:
 - From the roof closed position to the vent open position
 - From the roof open position to the vent open position
- Press and hold the vent close switch to the first detente or momentarily to the second detente, the roof will move as follows:
 - From the vent open position to the vent closed position
 - From the roof open position to the roof closed position

Roof Express Open/Close Operation

The roof express or vent express features allow for movement of the roof glass to desired positions in unsupervised modes. When the roof or vent open switch is momentarily pressed rearward to the second detente, the roof/vent open and roof/vent express signal circuits are simultaneously pulled low through the switch contacts signaling the sunroof motor/actuator assembly of the roof/vent express open request. The logic in the motor/actuator assembly then commands the motor to move the roof glass to the requested position. To stop the roof in a desired position during the express mode, momentarily press the sunroof switch in either direction.

The roof/vent express close feature is similar to the roof/vent express open feature, except that

the roof/vent close switch signal circuit is simultaneously pulled low with the express signal circuit. The sunroof motor/actuator assembly will then command the motor to move the roof glass to the closed position.

Roof Supervised Open/Close Operation

Supervised operation of the power sunroof system allows for the roof to be moved to a specific or desired position. When you press and hold the desired roof or vent open switch to the first detente of the switch, the roof/vent open switch signal circuit is pulled low through the switch contacts signaling the sunroof motor/actuator assembly of the roof/vent open request. The motor/actuator assembly then commands the motor to move the roof glass towards the open position until the switch is released. Closing the roof glass works similar to opening the roof, except that the roof/vent close switch signal circuit is pulled low signaling the motor/actuator assembly of the roof close request.

Sunroof Motor

The sunroof motor/actuator assembly has a bi-directional motor. The sunroof motor understands when it has driven the sunroof glass to the vent, close and open positions based on the internal hall effect sensors within the motor/actuator assembly. It interprets the hall effect sensor combinations and controls the sunroof motor to soft stop the sunroof glass at the open and closed positions.

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